APPROVED

UTAH DEPARTMENT OF TRANSPORTATION

UDOT

1999 METRIC STANDARD DRAWINGS

HELPFUL HINTS FOR USE OF THE FILE

L This file contains all current 1999 Metric Standard Drawings for the Utah Department of Transportation.

; DO NOT ATTEMPT TO PRINT THIS DOCUMENT OR ANY PORTION OF THIS DOCUMENT BEFORE READING THE BELOW INSTRUCTIONS AS PRINTING MAY CAUSE THE USER'S PC TO HANG UP. In most cases CTRL-ALT-DEL does not work to End Task, Shutdown, or Reboot. Power has to be turned off and back on to Reboot. This causes Windows 95/98/NT to not shut down properly and should be avoided if possible.

L **PRINTING INSTRUCTIONS**

- ! Use the "Print as image" setting in the Acrobat Reader's Print dialog.
- ! Print only one page at a time.

L Information on the use of this file.

- ! In Adobe Reader Version 4, to ZOOM in on a particular page select the magnifying glass button on the tool bar or select CTRL and the PLUS key to zoom in or CTRL and the MINUS key to zoom out. Repeated use of either set of keys will continue to zoom in or out. For earlier versions, refer to the VIEW pull-down menu for requirements.
- ! Once you have zoomed to the desired setting (around 300 % is the best), the drawings are set to use the selected setting until changed by the user or upon exit from the application.

Plan Sheet Codes and Descriptions

Sheet Identification Codes, Sheet Names and Plan Order

1. A coding system maintains sheet order during the design and construction of the project. The larger the project, the more important a coding system becomes because it facilitates sorting out specific data and it used extensively for cross referencing.

2. Coding shall consist of identifying each sheet of plans by the appropriate code letter as provided herein and by numbering those sheets consecutively, e.g., RD–1, RD–2, RD–3, etc. Include only codes applicable to project, all others leave out.

3. The project plan sheet name and sheet identification are both required on every sheet, except the title sheet. They should be placed in the standard title and revision block along the right hand edge of the plan sheet.

4. The sheet 1's (e,g., 1 title sheet, 1A–plan sheet codes and descriptions, 1B–index to plan sheets, 1C & 1D–index to standard drawings, 1E–storm water pollution prevention plan, etc.) do not require a sheet identification code.

5. When structure design plans (e.g., major or minor structure, sign structure, box culvert, retaining wall, etc.) are included in the plan set, UDOT Structures Division assigns appropriate structure numbers and shall be placed as provided above. Provide appropriate structure number and description blocks.

ID Code Letter	Sheet Name
Sequence of Plan Development – See Note 2	
1	Title Sheet – See Note 4
1A	Plan Sheet Codes and Descriptions
1B	Index to Plan
1C–1D	Index to Standard Drawings
1E	Storm Water Pollution Prevention Plan
TS	Typical Sections
DT	Details – which may include minor structures if no structure number is required.
SM	Summary
TC	Traffic Control (Use only when paid for by individual items)
RD	Roadway Plan
RP	Roadway Profile
PP	Plan and Profile – Use for small projects that can combine all information on the same sheet.
UT	Utility /Topography
UR	Utility Relocation
RR	Railroad
DR	Drainage
IR	Irrigation
EC	Erosion Control
LS	Landscaping
WM	Wetland Mitigation
SS	Signing and Striping
SG	Signal – When a project has more than one signal intersection. Individual intersections are numbered with a letter at the end, such as: SG–1A thru SG–9A and SG–1B thru SG–9B, etc.
SI	Signal Interconnect
LT	Lighting
AT	Advance Traffic Management System
RW	Right of Way
MS	Material Site
—	Structures Drawings – see Note 5
—	Standard Drawings

REVISIONS | NO. | DATE | BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION

DESIGN CHECK
DRAWN CHECK
QUANT. CHECK

APPROVAL RECOMM. DATE DESIGN ENGR.
APPROVED DATE CHIEF STRUCTURAL ENGR.

PLAN SHEET CODES and DESCRIPTIONS

PROJECT NUMBER

COUNTY

Sheet No. 1A

UTAH DEPARTMENT OF TRANSPORTATION

METRIC STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

	DWG. NO.	DESCRIPTION	DATE
	110	CONVENTIONAL SYMBOLS AND SIGNS	08-07-95
	450-1A	JOINTS FOR HIGHWAYS WITH CONCRETE TRAFFIC LANES AND SHOULDERS	11-14-00
	450-1B	PAVEMENT / APPROACH SLAB DETAILS	11-14-00
	450-2A	CONCRETE PAVEMENT DETAILS FOR URBAN AND INTERSTATE	12-14-99
	450-2B	CONCRETE PAVEMENT DETAILS FOR URBAN AND INTERSTATE	12-14-99
	450-3	URBAN CONCRETE PAVEMENT DETAILS	08-08-00
	460-1	RUMBLE STRIPS	12-11-01
	460-2	RUMBLE STRIPS TYPICAL APPLICATION	12-11-01
	545-1	PRECAST CONCRETE NOISE WALL 1 OF 2	12-08-98
	545-2	PRECAST CONCRETE NOISE WALL 2 OF 2	04-27-99
	545-3	NOISE WALL PLACEMENT AREA	03-13-01
	546-1	PRECAST CONCRETE RETAINING/NOISE WALL 1 OF 2	04-27-99
	546-2	PRECAST CONCRETE RETAINING/NOISE WALL 2 OF 2	04-27-99
	605-1	FILL HEIGHTS FOR METAL PIPE (STEEL)	11-14-00
	605-2	FILL HEIGHTS FOR METAL PIPE (ALUMINUM)	11-14-00
	605-3	HDPE END SECTION AND FILL HEIGHTS FOR PLASTIC ROUND PIPE CULVERT	04-18-01
	605-4	PLASTIC PIPE, METAL PIPE OR PIPE ARCH CULVERT BEDDING	11-14-00
	605-5	PRECAST CONCRETE PIPE CULVERT	11-14-00
	605-6	GASKETTED JOINTS OR COUPLING BANDS FOR C.M.P.	11-14-00
	605-7	METAL CULVERT END SECTIONS	11-14-00
	605-8	MISCELLANEOUS PIPE DETAILS	11-14-00
	615-1A	CONCRETE CURB AND GUTTER	12-08-98
	615-1B	CONCRETE CURB AND GUTTER DETAILS	02-08-00
	620-3	MEDIAN DRAIN INTO BOX CULVERT	12-08-98
	650-5	PRECAST MANHOLE MODIFICATION DETAILS	10-24-96
	715-1	CONCRETE DRIVEWAYS AND SIDEWALKS	04-18-01
	715-2	DISABLED PEDESTRIAN ACCESS	01-08-02
	720-1A	RIGHT-OF-WAY FENCE AND GATES (WOOD POSTS)	04-27-99
	720-1B	RIGHT-OF-WAY FENCE AND GATES (METAL POSTS)	12-14-99
	720-1C	SWING GATES TYPE I	04-27-99
	720-1D	DEER GATES	04-22-99
	720-1E	SWING GATES TYPE II FOR GATES WIDER THAN 5 m	04-27-99
	720-3	CHAIN LINK FENCE	03-09-99
	724-1	RIGHT-OF-WAY MARKER	11-14-00
	725-1	NEWSPAPER AND MAILBOX STOP LAYOUT	04-27-99
	725-1A	NEWSPAPER AND MAILBOX SUPPORT HARDWARE	06-08-99
	726-1	DELINEATION HARDWARE	02-10-98
	726-2	DELINEATION APPLICATION	02-10-98
	726-3	OBJECT MARKERS 'I' INTERSECTION & PAVEMENT TRANSITION GUIDANCE	02-10-98
	726-4	FREEWAY TURN AROUND MARKINGS	11-14-00

☒ MARKED BOXES INDICATE DRAWINGS APPLICABLE TO THIS PROJECT

	DWG. NO.	DESCRIPTION	DATE
	735-1A	BEAM GUARDRAIL HARDWARE	09-08-98
	735-1B	PRECAST CONCRETE HALF BARRIER STANDARD SECTION	07-10-01
	735-1C	PRECAST CONCRETE FULL BARRIER STANDARD SECTION	07-10-01
	735-1D	TRAFFIC CONTROL CABLE	04-27-99
	735-1E	SAND BARREL DETAILS	07-10-01
	735-1F	GUARDRAIL TRANSITION	04-27-99
	735-1G	ATTENUATOR/END SECTION MARKINGS	12-14-99
	735-1H	CAST IN PLACE CONSTANT SLOPE BARRIER	04-27-99
	735-1 I	DRAINAGE ATTENUATOR/END SECTION GUIDELINE "A"	02-08-00
	735-1J	ATTENUATOR DRAINAGE DETAILS GUIDELINE "B"	02-08-00
	735-1K	GRADING DETAIL END SECTION TYPE "H"	12-14-99
	735-1L	GRADING DETAIL END SECTION TYPE "G", TYPE "F"	12-14-99
	735-1M	DETAILS FOR PLACEMENT ATTENUATORS A, B & D	02-08-00
	735-1N	GRADING & PLACEMENT DETAIL ATTENUATOR TYPE "C"	02-08-00
	745-1•	CONSTRUCTION SIGNING CHANNELIZATION DEVICES	09-11-01
	745-2	TRAFFIC CONTROL GENERAL	04-10-01
	745-2A	TRAFFIC CONTROL PROJECT LIMIT SIGNING	11-14-00
	745-2B	TRAFFIC CONTROL LANE CLOSURE	11-14-00
	745-2C	TRAFFIC CONTROL FLAGGING OPERATION	04-10-01
	745-2D	TRAFFIC CONTROL EXPRESSWAY AND FREEWAY CROSSOVER/TURN-AROUND	11-14-00
	745-2E	TRAFFIC CONTROL ROAD CLOSED, DETOUR	04-10-01
	745-2F	TRAFFIC CONTROL URBAN INTERSECTION WITH ROADWAYS UNDER 50 MPH	11-14-00
	745-2G	TRAFFIC CONTROL URBAN INTERSECTION WITH ROADWAYS UNDER 50 MPH	11-14-00
	745-2H	TRAFFIC CONTROL MULTILANE CLOSURE	11-14-00
	745-2 I	TRAFFIC CONTROL SHOULDER-HAUL ROAD	11-14-00
	745-2J	TRAFFIC CONTROL PAVEMENT MARKING	11-14-00
	745-2K	TRAFFIC CONTROL PEDESTRIAN ROUTING	11-14-00
	745-2L	TRAFFIC CONTROL 2 LANE/ 2 WAY SEAL COAT WITH COVER MATERIAL	04-10-01
	745-2M	TRAFFIC CONTROL ENTRANCE RAMP GORE	11-14-00
	745-2N	TRAFFIC CONTROL EXIT RAMP GORE	11-14-00
	745-25	BRIDGE LOAD LIMIT SIGNS	03-14-97
	745-41	TYPICAL PAVEMENT MARKINGS	02-13-01
	745-42	PLOWABLE PAVEMENT MARKINGS	04-22-99
	745-44	CROSSWALKS, PARKING AND INTERSECTION APPROACHES	04-22-99
	745-45	PAINTED MEDIAN & AUXILIARY LANE DETAILS	04-22-99
	745-46	PASSING LANES TRAFFIC CONTROL	04-11-00
	745-47	PAVEMENT MARKINGS & SIGNS AT RAILROAD CROSSING	12-14-99
	745-48A	FLASHING SCHOOL SIGN	11-14-00
	745-48B	OVERHEAD SCHOOL FLASHER	11-14-00
	745-49	FLASHING STOP SIGN	04-27-99
	745-50A	GROUND MOUNTED SIGNS INSTALLATION DETAILS	02/09/99
	745-50B	GROUND MOUNTED SIGNS INSTALLATION DETAILS	12/11/01
	745-50C	GROUND MOUNTED SIGNS INSTALLATION DETAILS	04-22-99
	745-51	TYPICAL INSTALLATION FOR MILEPOST SIGNS	09-08-98
	745-52	PROJECT PUBLIC INFORMATION SERVICES SIGNS	08-10-99

• SHALL BE INCLUDED IN ALL PROJECTS

	DWG. NO.	DESCRIPTION	DATE
	745-55A1	TRAFFIC SIGNALS MAST ARM POLE AND LUMINAIRE EXTENSION	04-22-99
	745-55A2	TRAFFIC SIGNALS MAST ARM DETAIL 7.6 m THRU 19.8 m	11-14-00
	745-55B	UNDERGROUND SERVICE PEDESTAL DETAILS	08-11-95
	745-55C	TRAFFIC SIGNALS MAST ARM POLE FOUNDATION	11-14-00
	745-55D	BREAKAWAY POST MOUNTED TRAFFIC SIGNAL POLE	04-22-99
	745-55E	POWER SOURCE DETAILS	04-22-99
	745-55F	SPAN WIRE SIGNAL POLE DETAIL	04-22-99
	745-55G	SIGNAL HEAD DETAILS	04-22-99
	745-55J	PEDESTRIAN SIGNAL ASSEMBLY	04-22-99
	745-55K	CONTROLLER BASE DETAILS	05-12-98
	745-55L	TRAFFIC SIGNALS LOOP DETECTOR DETAIL	11-14-00
	745-55M	JUNCTION BOX DETAILS	04-22-99
	745-55N	TRAFFIC COUNTING LOOP DETECTOR DETAIL	08-14-01
	745-60•	PLACEMENT OF GROUND MOUNT SIGNS	09-11-01
	745-60A	GROUND MOUNT TIMBER SIGN POST (P1)	12-11-01
	745-60B	GROUND MOUNT TUBULAR STEEL SIGN POST (P2)	12-11-01
	745-60C	GROUND MOUNT SQUARE STEEL SIGN POST (P3)	12-11-01
	745-60D	SLIPBASE GROUND MOUNT TUBULAR STEEL SIGN POST (P4)	12-11-01
	755-1	LIGHT POLE BREAKAWAY BASE	07-10-01
	755-2	LUMINAIRE BREAKAWAY BASE DETAIL	04-22-99
	755-3	SINGLE TRANSFORMER SUBSTATION DETAILS	04-22-99
	755-6	LIGHT POLE ANCHOR BASE	04-27-99
	755-7	LIGHT POLE FOUNDATION EXTENSION	04-27-99
	760-1A	WELDED END GUARD UNIT	10-20-97
	760-1B	PRECAST CONCRETE CATTLE GUARD	04-27-99
	805-1	SUPERELEVATION AND WIDENING	12-14-99
	805-2	DESIGN CONTROLS FOR CREST VERTICAL CURVES	04-27-99
	805-2A	DESIGN CONTROLS FOR SAG VERTICAL CURVES	04-27-99
	805-2B	SIGHT DISTANCE ON HORIZONTAL CURVES	12-12-00
	805-3	FREEWAY TURN AROUNDS	03-13-01
	810-5A	CLIMBING LANES	04-11-00
	810-5B	CLIMBING LANES EXAMPLE	12-09-96
	815-1	GEOMETRIC DESIGN STANDARDS FOR FREEWAYS (ROADWAY)	04-10-01
	815-2	DESIGN STANDARDS FOR RURAL MULTI-LANE HIGHWAYS OTHER THAN FREEWAYS	04-10-01
	815-3A	STANDARDS FOR RURAL TWO-LANE HIGHWAYS	04-10-01
	815-3B	STANDARDS FOR RURAL TWO-LANE HIGHWAYS	04-10-01
	815-4	FRONTAGE AND ACCESS ROAD STANDARDS FOR LOW VOLUME ROADS (UNDER 50 ADT)	04-10-01
	815-5	RAISED MEDIAN	04-27-99
	815-6	STANDARDS FOR URBAN ROADWAYS	12-12-00
	815-7	STRUCTURE GEOMETRICS DESIGN STANDARDS	04-14-99
	815-8	RAILROAD CLEARANCE AT HIGHWAY OVERPASS STRUCTURES	01-13-98
	825-1	ENTRANCE AND EXIT RAMP GEOMETRICS	07-14-98
	825-2	TYPICAL RURAL TWO-LANE ROAD WITH MEDIAN LANE AND DECELERATION LANE FOR INTERSECTING CROSSROADS	04-14-99

NO.	DATE	APPR.	REMARKS
3	02/09/00	B.A.	CHANGE 3
4	11/14/00	B.A.	CHANGE 4, SHEET RENUMBERED FROM 1-A TO 1-C
5	04/18/01	B.A.	CHANGE 5
6	01/08/02	J.W.	CHANGE 6

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — JAN.08, 2002 DATE

APPROVED

DEPUTY DIRECTOR — JAN.08, 2002 DATE

(METRIC)

STANDARD DRAWINGS
INDEX SHEET

STANDARD DRAWING TITLE

STD. DWG. NO.
1-C

UTAH DEPARTMENT OF TRANSPORTATION

METRIC STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

	DWG. NO.	DESCRIPTION	DATE
	1010	TEMPORARY EROSION CONTROL (CHECK DAMS)	04-13-99
	1011	TEMPORARY EROSION CONTROL (SILT FENCE)	04-13-99
	1012	TEMPORARY EROSION CONTROL (SLOPE DRAIN AND TEMPORARY BERM)	04-13-99
	1013	TEMPORARY EROSION CONTROL (DROP INLET BARRIERS)	04-13-99
	1014	TEMPORARY EROSION CONTROL (SEDIMENT TRAP AND CURB INLET BARRIER)	04-13-99
	1329	STANDARD CATCH BASIN	03-09-99
	1330	CURB INLET CATCH BASIN	03-09-99
	1384-1	STANDARD TRASH RACKS 90° X-ING L	03-09-99
	1384-2	STANDARD TRASH RACKS	03-09-99
	1384-3	STANDARD TRASH RACKS	03-09-99
	1551-1	STANDARD DIVERSION BOX/COVER PLATE/GRATING FOR 450 mm DIA. OR 600 mm DIA. PIPE	03-09-99
	1551-2	STANDARD DIVERSION BOX HINGED LID DETAILS FOR 450 mm DIA. OR 600 mm DIA. PIPE	03-09-99
	1551-3	STANDARD DIVERSION BOX BICYCLE - SAFE GRATING DETAILS FOR 450 mm DIA. OR 600 mm DIA. PIPE	03-09-99
	1551-4	STANDARD DIVERSION BOX THREE GATE BOX SECTIONS FOR 450 mm DIA. OR 600 mm DIA. PIPE	03-09-99
	1551-5	STANDARD DIVERSION BOX THREE GATE BOX SECTIONS FOR 450 mm DIA. OR 600 mm DIA. PIPE	03-09-99
	1551-6	STANDARD DIVERSION BOX THREE GATE BOX SECTIONS FOR 450 mm DIA. OR 600 mm DIA. PIPE	03-09-99
	1562-1	STANDARD DIVERSION BOX W/INTERCHANGEABLE WALLS BOTTOM SLAB, WALLS AND APRON DETAILS	03-09-99
	1562-2	STANDARD DIVERSION BOX W/INTERCHANGEABLE WALLS QUANTITIES SCHEDULE	03-09-99
	1562-3	STANDARD DIVERSION BOX W/INTERCHANGEABLE WALLS HAND SLIDE GATE DETAILS	03-09-99
	1562-4	STANDARD DIVERSION BOX TYPE "G" HAND SLIDE GATE DETAILS	03-09-99
	1562-5	STANDARD DIVERSION BOX HINGED LID (SOLID COVER PLATE) TYPE "A" DETAILS TYPE I PLAN	03-09-99
	1562-6	STANDARD DIVERSION BOX HINGED LID (SOLID COVER PLATE) TYPE "A" DETAILS TYPE II PLAN	03-09-99
	1562-7	STANDARD DIVERSION BOX HINGED LID SOLID COVER TYPE "B" DETAILS	03-09-99
	1562-8	STANDARD DIVERSION BOX HINGED LID SOLID COVER TYPE "B" & "C" DETAILS	03-09-99

☒ MARKED BOXES INDICATE DRAWINGS APPLICABLE TO THIS PROJECT

	DWG. NO.	DESCRIPTION	DATE
	1562A	STANDARD TRANSITION CONCRETE LINED DITCH TO PIPE OR DIVERSION BOX FOR 305 mm BOTTOM DITCH	03-09-99
	1567	SOLID COVER FOR STANDARD DRAWING 1551 MS-18 LOADING	03-09-99
	1584	STANDARD SCREW GATE AND FRAME	03-09-99
	1624-1	STANDARD DROP INLET DETAILS GENERAL NOTES AND INSTALLATION DETAIL	03-09-99
	1624-2	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "A" DETAILS	04-10-01
	1624-3	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "B" DETAILS	03-09-99
	1624-4	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "C" DETAILS	03-09-99
	1624-5	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET WITH ATTACHED APRON DETAILS	03-09-99
	1624-6	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET WITH ATTACHED APRON DETAILS	03-09-99
	1624-7	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "D" DETAILS	03-09-99
	1624-8	STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "D" TABLES	03-09-99
	1627	STANDARD CURB AND GUTTER DROP INLET	03-09-99
	1653-1	STANDARD DIVERSION BOX WITH MANHOLE COVER SITUATION AND LAYOUT	03-09-99
	1653-2	STANDARD DIVERSION BOX WITH MANHOLE COVER 0-1067 RCP & 0-1372 CMP	03-09-99
	1653-3	STANDARD DIVERSION BOX WITH MANHOLE COVER 1219-1829 RCP & 1524-2134 CMP	03-09-99
	1656-1	DOUBLE CATCH BASIN	03-09-99
	1656-2	DOUBLE CATCH BASIN	03-09-99
	1701	MANHOLE FRAME AND GRATED COVER	03-09-99
	1702	MANHOLE FRAME AND SOLID COVER	03-09-99
	1703	RECTANGULAR GRATE & FRAME	03-09-99
	1704	DIRECTIONAL FLOW GRATE & FRAME	03-09-99
	1705	SOLID COVER & FRAME	03-09-99
	1706	MANHOLE STEPS	03-09-99
	1707	STANDARD SCREW GATE & FRAME	03-09-99
	1708	724 mm x 592 mm GRATE AND FRAME	03-09-99
	1709	724 mm x 592 mm DIRECTIONAL FLOW AND FRAME	03-09-99

• SHALL BE INCLUDED IN ALL PROJECTS

	DWG. NO.	DESCRIPTION	DATE
	1710-1	STANDARD CATCH BASIN AND CLEANOUT BOX SITUATION & LAYOUT	03-09-99
	1710-2	STANDARD CATCH BASIN AND CLEANOUT BOX SECTION DETAILS	03-09-99
	1710-3	STANDARD CATCH BASIN AND CLEANOUT BOX SCHEDULE OF INSTALLATION 450-1050 RCP 300-1200 CMP	03-09-99
	1710-4	STANDARD CATCH BASIN AND CLEANOUT BOX SCHEDULE OF INSTALLATION 450-1050 RCP 300-1200 CMP	03-09-99
	1711-1	STANDARD CATCH BASIN AND CLEANOUT BOX SITUATION & LAYOUT	03-09-99
	1711-2	STANDARD CATCH BASIN AND CLEANOUT BOX SECTION DETAILS	03-09-99
	1711-3	STANDARD CATCH BASIN AND CLEANOUT BOX SCHEDULE OF INSTALLATION 1050-1500 RCP 1200-1800 CMP	03-09-99
	2100-1	LEGEND SHEET	01-08-02
	2100-2	RAMP METER DETAILS	01-08-02
	2100-3	RAMP METER SIGN PANEL	01-08-02
	2100-4	TYPICAL RAMP METER SIGNAL HEAD MOUNTING	01-08-02
	2100-5	LOOP INSTALLATION	01-08-02
	2100-6	CONDUIT DETAILS	01-08-02
	2100-7	POLYMER-CONCRETE JUNCTION BOX DETAILS	01-08-02
	2100-8	ATMS CABINET W/120V DISCONNECT	01-08-02
	2100-9	ATMS CAB WITH STEPDOWN TRANSFORMER	01-08-02
	2100-10	DOMED CCTV DETAILS	01-08-02
	2100-11	CCTV POLE DETAIL	01-08-02
	2100-12	CCTV POLE FOUNDATION FOR DEDICATED CCTV POLE	01-08-02
	2100-13	120V VMS CAB FOUNDATION DETAILS	01-08-02
	2100-14	WEIGHT IN MOTION PIEZO DETAIL	01-08-02

REVISIONS

NO.	DATE	APP'D	REMARKS
1	11/14/00	B.A.	SHEET RENUMBERED FROM 1-B TO 1-D
2	04/18/01	B.A.	CHANGE 5
3	01/08/02	F.W.	CHANGE 6 ADDED ATMS DRAWINGS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

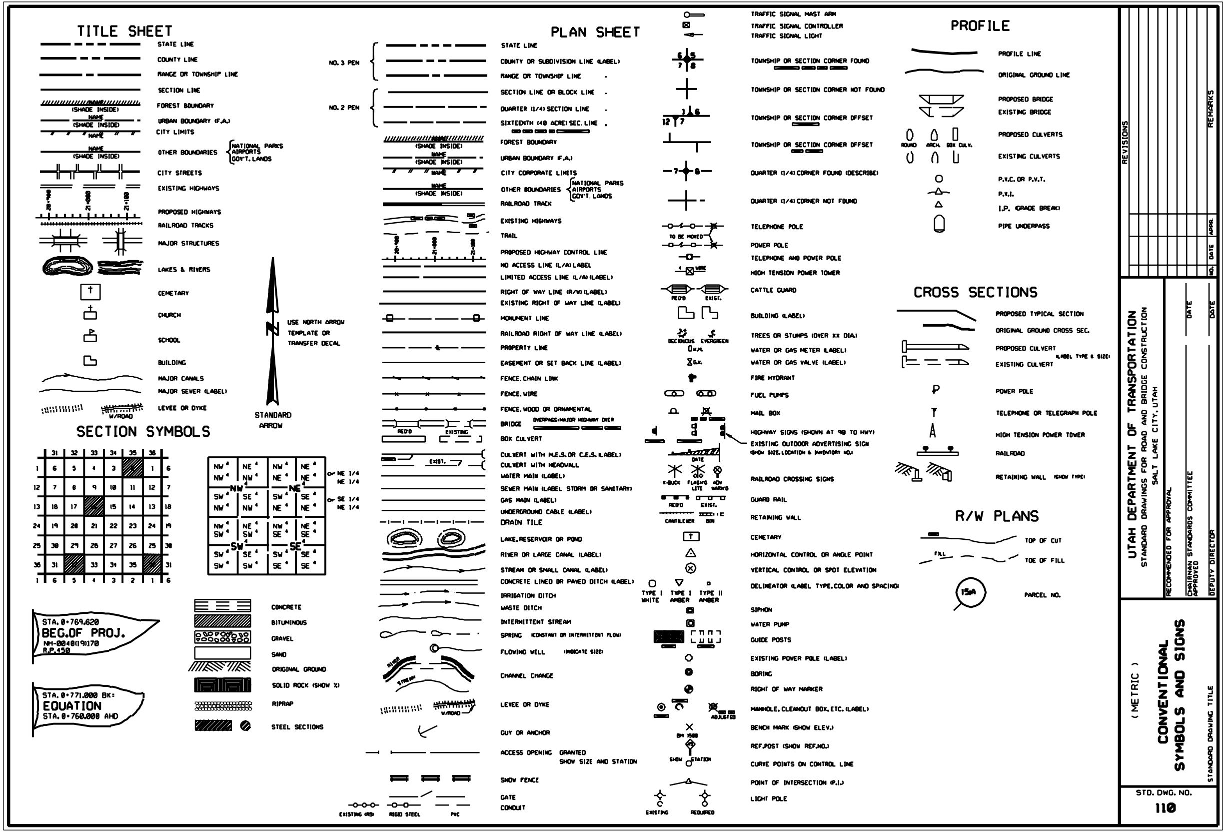
RECOMMENDED FOR APPROVAL — JAN.08.2002 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — JAN.08.2002 DATE
DEPUTY DIRECTOR

(METRIC)

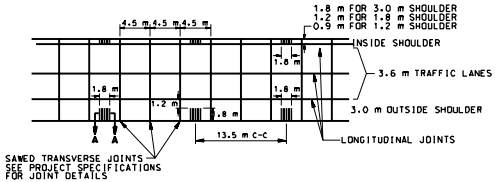
STANDARD DRAWINGS
INDEX SHEET

STANDARD DRAWING TITLE

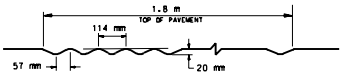
STD. DWG. NO.
1-D


TITLE SHEET
STATE LINE
COUNTY LINE
RANGE OR TOWNSHIP LINE
SECTION LINE
NAME (SHADE INSIDE)
FOREST BOUNDARY
NAME (SHADE INSIDE)
URBAN BOUNDARY (F.A.)
NAME
CITY LIMITS
NAME (SHADE INSIDE)
OTHER BOUNDARIES
NATIONAL PARKS
AIRPORTS
GOV'T. LANDS
CITY STREETS
EXISTING HIGHWAYS
PROPOSED HIGHWAYS
RAILROAD TRACKS
MAJOR STRUCTURES
LAKES & RIVERS
CEMETARY
CHURCH
SCHOOL
BUILDING
MAJOR CANALS
MAJOR SEWER (LABEL)
LEVEE OR DYKE
W/ROAD
USE NORTH ARROW
TEMPLATE OR
TRANSFER DECAL
STANDARD
ARROW
SECTION SYMBOLS
NW
NE
SW
SE
NE 1/4
NE 1/4
SE 1/4
NE 1/4
STA. 0+769.620
BEG.OF PROJ.
NH-0048(19)170
R.P.450
STA. 0+771.000 BK:
EQUATION
STA. 0+760.000 AHD
CONCRETE
BITUMINOUS
GRAVEL
SAND
ORIGINAL GROUND
SOLID ROCK (SHOW %)
RIPRAP
STEEL SECTIONS
PLAN SHEET
NO. 3 PEN
NO. 2 PEN
STATE LINE
COUNTY OR SUBDIVISION LINE (LABEL)
RANGE OR TOWNSHIP LINE
SECTION LINE OR BLOCK LINE
QUARTER (1/4) SECTION LINE
SIXTEENTH (40 ACRE) SEC. LINE
FOREST BOUNDARY
URBAN BOUNDARY (F.A.)
CITY CORPORATE LIMITS
OTHER BOUNDARIES
NATIONAL PARKS
AIRPORTS
GOV'T. LANDS
RAILROAD TRACK
EXISTING HIGHWAYS
TRAIL
PROPOSED HIGHWAY CONTROL LINE
NO ACCESS LINE (L/A) LABEL
LIMITED ACCESS LINE (L/A) (LABEL)
RIGHT OF WAY LINE (R/W) (LABEL)
EXISTING RIGHT OF WAY LINE (LABEL)
MONUMENT LINE
RAILROAD RIGHT OF WAY LINE (LABEL)
PROPERTY LINE
EASEMENT OR SET BACK LINE (LABEL)
FENCE, CHAIN LINK
FENCE, WIRE
FENCE, WOOD OR ORNAMENTAL
BRIDGE
OVERPASS (MAJOR HIGHWAY OVER
REQ'D
EXISTING
BOX CULVERT
EXIST.
CULVERT WITH M.E.S. OR C.E.S. (LABEL)
CULVERT WITH HEADWALL
WATER MAIN (LABEL)
SEWER MAIN (LABEL STORM OR SANITARY)
GAS MAIN (LABEL)
UNDERGROUND CABLE (LABEL)
DRAIN TILE
LAKE, RESERVOIR OR POND
RIVER OR LARGE CANAL (LABEL)
STREAM OR SMALL CANAL (LABEL)
CONCRETE LINED OR PAVED DITCH (LABEL)
IRRIGATION DITCH
WASTE DITCH
INTERMITTENT STREAM
SPRING (CONSTANT OR INTERMITTENT FLOW)
FLOWING WELL (INDICATE SIZE)
RIVER
STREAM
CHANNEL CHANGE
W/ROAD
LEVEE OR DYKE
GUY OR ANCHOR
ACCESS OPENING GRANTED
SHOW SIZE AND STATION
SNOW FENCE
GATE
CONDUIT
EXISTING (RS)
RIGID STEEL
PVC
TRAFFIC SIGNAL MAST ARM
TRAFFIC SIGNAL CONTROLLER
TRAFFIC SIGNAL LIGHT
TOWNSHIP OR SECTION CORNER FOUND
TOWNSHIP OR SECTION CORNER NOT FOUND
TOWNSHIP OR SECTION CORNER OFFSET
TOWNSHIP OR SECTION CORNER OFFSET
QUARTER (1/4) CORNER FOUND (DESCRIBE)
QUARTER (1/4) CORNER NOT FOUND
TO BE MOVED
TELEPHONE POLE
POWER POLE
TELEPHONE AND POWER POLE
WIRE
HIGH TENSION POWER TOWER
REQ'D
EXIST.
CATTLE GUARD
BUILDING (LABEL)
DECIDUOUS
EVERGREEN
TREES OR STUMPS (OVER XX DIA)
W.M.
WATER OR GAS METER (LABEL)
G.V.
WATER OR GAS VALVE (LABEL)
FIRE HYDRANT
FUEL PUMPS
MAIL BOX
HIGHWAY SIGNS (SHOWN AT 90 TO HWY)
EXISTING OUTDOOR ADVERTISING SIGN
(SHOW SIZE, LOCATION & INVENTORY NO.)
DATE
X-BUCK
FLASHING LITE
ADV WARN'G
RAILROAD CROSSING SIGNS
REQ'D
EXIST.
GUARD RAIL
CANTILEVER
BIN
RETAINING WALL
CEMETARY
HORIZONTAL CONTROL OR ANGLE POINT
VERTICAL CONTROL OR SPOT ELEVATION
TYPE I WHITE
TYPE I AMBER
TYPE II AMBER
DELINEATOR (LABEL TYPE, COLOR AND SPACING)
SIPHON
WATER PUMP
GUIDE POSTS
EXISTING POWER POLE (LABEL)
BORING
RIGHT OF WAY MARKER
ADJUSTED
MANHOLE, CLEANOUT BOX, ETC. (LABEL)
BENCH MARK (SHOW ELEV.)
BM 1500
REF.POST (SHOW REF.NO.)
SHOW STATION
CURVE POINTS ON CONTROL LINE
POINT OF INTERSECTION (P.I.)
EXISTING
REQUIRED
LIGHT POLE
PROFILE
PROFILE LINE
ORIGINAL GROUND LINE
PROPOSED BRIDGE
EXISTING BRIDGE
ROUND
ARCH.
BOX CULV.
PROPOSED CULVERTS
EXISTING CULVERTS
P.V.C. OR P.V.T.
P.V.I.
I.P. (GRADE BREAK)
PIPE UNDERPASS
CROSS SECTIONS
PROPOSED TYPICAL SECTION
ORIGINAL GROUND CROSS SEC.
PROPOSED CULVERT
(LABEL TYPE & SIZE)
EXISTING CULVERT
POWER POLE
TELEPHONE OR TELEGRAPH POLE
HIGH TENSION POWER TOWER
RAILROAD
RETAINING WALL (SHOW TYPE)
R/W PLANS
TOP OF CUT
FILL
TOE OF FILL
15A
PARCEL NO.
REVISIONS
REMARKS
APPR.
DATE
NO.
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH
RECOMMENDED FOR APPROVAL
DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED
DATE
DEPUTY DIRECTOR
(METRIC)
CONVENTIONAL
SYMBOLS AND SIGNS
STANDARD DRAWING TITLE
STD. DWG. NO.
110

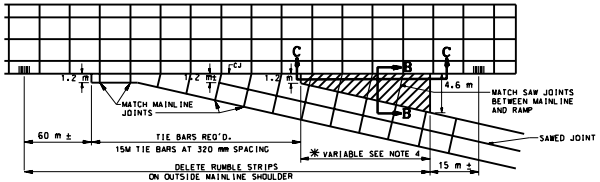
JOINTS FOR HIGHWAYS WITH CONCRETE TRAFFIC LANES AND SHOULDERS



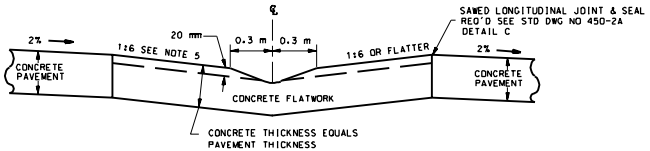
TYPICAL JOINT LOCATION AND RUMBLE STRIP DETAIL



SECTION A - A
URBAN AND/OR RURAL



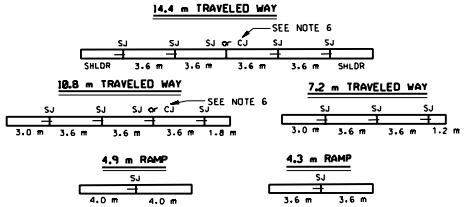
SHOULDER TRANSITION FOR RAMPS
RAMP GORE PAVING DETAIL



SECTION B - B

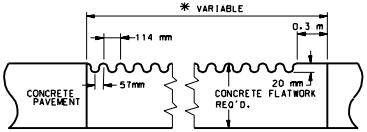
NOTES:

1. DO NOT PLACE RUMBLE STRIPS OVER STRUCTURES.
2. IN FORMING THE RUMBLE STRIP REMOVE EXCESS MATERIAL SUCH THAT THERE IS NO PROJECTION OF THE CONCRETE ABOVE THE FINISH GRADE OF THE PAVEMENT.
3. RUMBLE STRIPS NOT REQUIRED WHERE CONCRETE CURB & GUTTER IS PLACED.
4. ESTIMATED QUANTITIES FOR CONCRETE FLATWORK ARE CALCULATED ON TANGENT SECTION. IN ALL CASES LENGTH OF GORE PAVING WILL BE CARRIED AHEAD UNTIL THE DISTANCE BETWEEN PAVING IS 4.6m.
5. SLOPE MAY VARY TO MEET DESIGN CONDITIONS ON RAMP AND MAINLINE. GRADE TO DRAIN - ADJUST FOR FIELD CONDITIONS. CORRUGATIONS NORMAL TO MAINLINE.
6. CONTACT JOINT (CJ) TIE BARS REQ'D AT ALL LOCATIONS WHERE CONCRETE IS TO BE EXTENDED SEE STD DWG NO's 450-2A AND 450-2B FOR JOINT DETAILS



REQUIRED PAVING CONFIGURATIONS

CJ - CONTACT JOINT
SJ - SAW JOINT



SECTION C - C

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS
1	10/27/99	JCB	NEW DRAWING. REVISIONS OF STD DWG NO 450-1
2	07/19/00	JCB	REVISED DIMENSIONS IN "TYPICAL JOINT LOCATION AND RUMBLE STRIP DETAIL".
3	07/25/00	JCB	ADDED BAR SIZE AND SPACING TO "SHOULDER TRANSITION FOR RAMPS DETAIL".

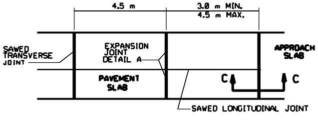
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DATE: NOV.14, 2000
CHAIRMAN STANDARDS COMMITTEE
APPROVED — DATE: NOV.14, 2000
DEPUTY DIRECTOR

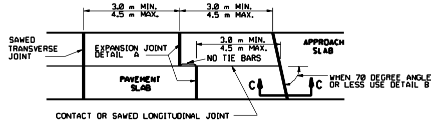
(METRIC)
STANDARD DRAWING TITLE: JOINTS FOR HIGHWAYS WITH CONCRETE TRAFFIC LANES AND SHOULDERS

STD. DWG. NO.
450-1A

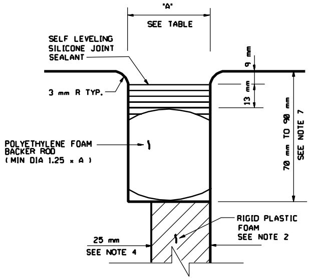
PAVEMENT / APPROACH SLAB DETAILS



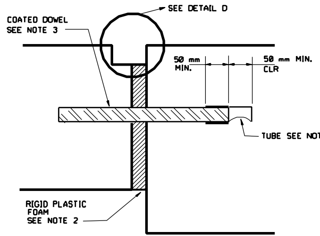
NORMAL APPROACH SLAB



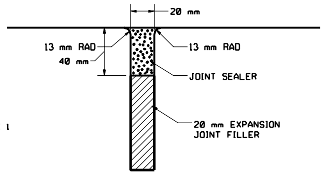
SKEWED APPROACH SLAB



DETAIL "D"



SECTION C-C



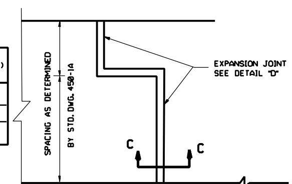
DETAIL "A"
(EXPANSION JTS.)

NOTES:

1. PLACE A TUBE OVER THE LUBRICATED END OF ALL DOWEL BARS AND PROVIDE A MINIMUM 50 mm CLEARANCE POCKET ASSURED BY MEANS OF A POSITIVE SPACING DEVICE.
2. USE CLOSED CELL, RIGID PLASTIC FOAM. CUT RIGID PLASTIC FOAM TO CONFORM TO THE CROSS SECTION OF THE PAVEMENT AND FURNISH IN STRIPS EQUAL TO THE WIDTH OF THE PAVEMENT SLAB. MAKE THE TOP SURFACE SMOOTH AND HAVE HOLES PUNCHED FOR THE DOWEL BARS. PROVIDE A SNUG FIT WITHOUT LOSS IN THICKNESS OF THE MATERIAL.
3. PLACE DOWEL BARS PARALLEL TO THE CONTROL LINE AND SURFACE OF THE SLAB AT MID DEPTH OF PAVEMENT.
4. FOR BRIDGES GREATER THAN 80 m LENGTH, USE 38 mm FOR TEMPERATURES LESS THAN 10°C AT TIME OF ROADWAY PAVING.
5. DO NOT INSTALL JOINT SEALANT ABOVE 32°C OR BELOW 10°C.
6. FOR STEPPED END APPROACH SLABS, APPLY DETAIL D ALONG LONGITUDINAL EDGES OF STEP. HOWEVER, DO NOT PLACE DOWELS ALONG LONGITUDINAL EDGES.
7. DEPTH TO BE DETERMINED BY CONTRACTOR BASED ON ACTUAL COMPRESSED BACKER ROD HEIGHT.

APPROACH SLAB JOINT WIDTH (mm)

TEMPERATURE (DEG C)	DIMENSION A (FOR BRIDGES GREATER THAN 80 m LENGTH)	DIMENSION A (FOR ALL OTHER BRIDGES)
32	32 (SEE NOTE 5)	32 (SEE NOTE 5)
17	42	38
2	50	42 (SEE NOTE 5)



DETAIL "B"
TYPICAL EACH SLAB

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

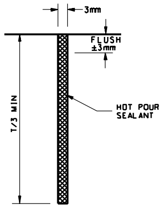
NO.	DATE	APPR.	REMARKS
1	10/27/99	JCB	NEW DRAWING REPLACES PORTIONS OF STD DWG NO 450-1
2	07/18/00	JCB	REVISED DIMENSION IN THE TOP TWO DETAILS.
3	09/13/00	JCB	REVISED DETAIL B AND NOTE 6
4	11/02/00	BW	REVISED DETAILS "NORMAL APPROACH SLAB" AND "SKEWED APPROACH SLAB"

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

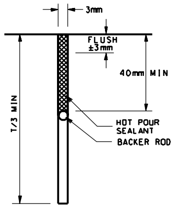
RECOMMENDED FOR APPROVAL — NOV.14, 2000 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — NOV.14, 2000 DATE
DEPUTY DIRECTOR

(METRIC)
PAVEMENT / APPROACH SLAB DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
450-1B

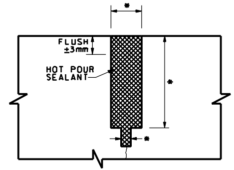


DETAIL "A"



DETAIL "B"

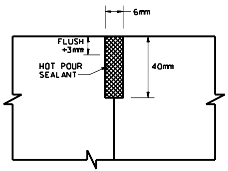
OPTIONAL INSTALLATION



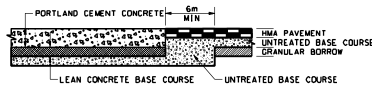
DETAIL "D"

EXISTING SILICONE JOINT REHAB DETAIL

* ALL DIMENSIONS AS PER EXISTING PAVEMENT



DETAIL "C"



CONCRETE TO FLEXIBLE PAVEMENT TRANSITION DETAIL "E"

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

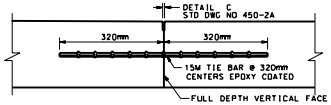
REVISIONS				
NO.	DATE		REMARKS	
1	10/27/99	JCB	NEW DRAWING REPLACES PORTIONS OF STD DWG NO 450-2	[redacted]

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC 14,1999 [redacted]
CHAIRMAN STANDARDS COMMITTEE
APPROVED — DEC 14,1999
DEPUTY DIRECTOR — DATE

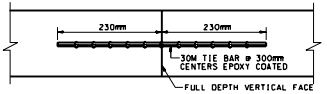
(METRIC)
CONCRETE PAVEMENT DETAILS FOR URBAN AND INTERSTATE
STANDARD DRAWING TITLE

STD. DWG. NO.
450-2A



LONGITUDINAL CONTACT JOINT (CJ)

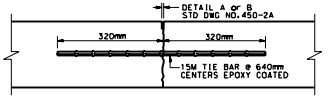
DETAIL "A"



CONTACT JOINT

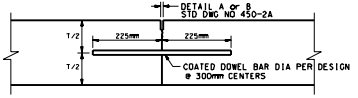
DETAIL "B"

FOR MID PANEL REPLACEMENT



SAWED LONGITUDINAL JOINT

DETAIL "C"

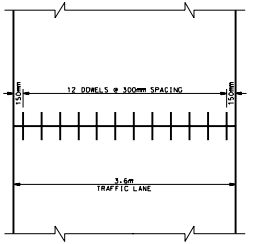


LOAD TRANSFER DOWEL BAR PLACEMENT

TRANSVERSE JOINT

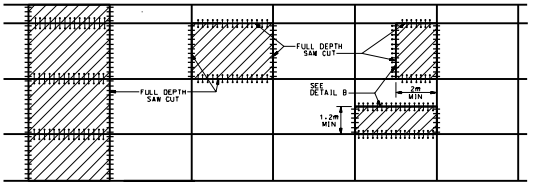
DETAIL "D"

PROVIDE DOWEL BARS PARALLEL TO THE CENTERLINE AND TO THE PAVEMENT SURFACE (±6mm) DEVIATIONS FROM PARALLEL SHALL BE LIMITED TO 6mm IN THE LENGTH OF THE DOWEL BAR



LOAD TRANSFER DOWEL BAR LAYOUT

TYPICAL PAVEMENT PANEL REPLACEMENT



FULL WIDTH REPLACEMENT

- DOWEL BARS @ 300 mm O.C.
- TIE BARS @ 320 mm O.C. FOR CONTACT JT. @ 640 mm O.C. FOR SAWED JT.

FULL PANEL REPLACEMENT

- DOWEL BARS @ 300 mm O.C.
- TIE BARS @ 320 mm O.C.

PARTIAL PANEL REPLACEMENT

- TIE BARS @ 320 mm O.C.
- DOWEL BARS @ 300 mm O.C.
- TIE BARS @ 300 mm O.C.

DOWELS - EPOXY COATED

SMOOTH BAR 30mm x 460 mm

TIE BARS - EPOXY COATED

LONGITUDINAL SAWED	15mm x 640 mm	DEFORMED REBAR
LONGITUDINAL CONTACT	15mm x 460 mm	" "
TRANSVERSE	30mm x 460 mm	" "

O.C. = ON CENTER

REVISIONS

NO.	DATE	BY	REMARKS
1	10/26/99	JCR	REX DRAWING REPLACES PORTIONS OF STD DWG NO 450-2

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC. 14, 1995
CHAIRMAN STANDARDS COMMITTEE — DATE
APPROVED — DEC. 14, 1995
DEPUTY DIRECTOR — DATE

(METRIC)

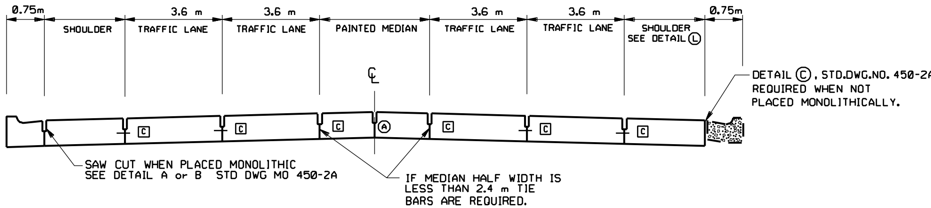
CONCRETE PAVEMENT DETAILS FOR URBAN AND INTERSTATE

STANDARD DRAWING TITLE

STD. DWG. NO.
450-28

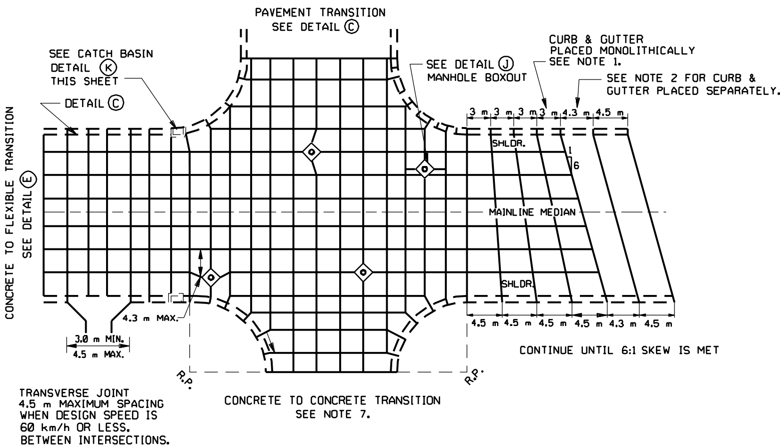
ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

CONCRETE PAVEMENT DETAILS

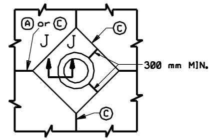


NOTES:

1. WHEN CURB & GUTTER IS PLACED MONOLITHICALLY WITH PAVEMENT, THE CURB & GUTTER JOINTS SHALL BE CONTINUOUS WITH THE PAVEMENT.
2. WHEN CURB & GUTTER IS PLACED SEPARATELY FROM THE PAVEMENT THE JOINTS WILL BE NORMAL TO THE FLOWLINE AND AT 1/2 THE PAVEMENT JOINT SPACING.
3. WHERE CONCRETE PAVEMENT IS PLACED AGAINST EXISTING CURB & GUTTER, DRIVEWAYS AND WALKWAYS PLACE A BOND BREAKER AS SHOWN IN DETAIL L AND SECTION K-K
4. REFER TO PROJECT SPECIFICATIONS FOR JOINT INFORMATION AND DETAILS.
5. PREFERRED TRANSVERSE JOINT LOCATIONS ARE: MORE THAN 1.5m FROM LARGE APPURTENANCES WITH NO BOXOUT; OR AT THE CORNER OF RECTANGULAR BOXOUTS OR APPURTENANCES.
6. WHEN A JOINT FALLS WITHIN 1.5m OF OR CONTACTS BASINS, MANHOLES, OR OTHER STRUCTURES, SHORTEN ONE OR MORE PANELS EITHER SIDE OF OPENING TO PERMIT JOINT TO FALL AT CORNERS OF RECTANGULAR STRUCTURES.
7. DETAIL (E) REQ'D. WHEN CROSS STREET IS CONCRETE AND AT STRUCTURES. STD. DWG. NO. 450-2A.
8. SEE STD. DWG. NO. 615-1B FOR CURB & GUTTER DETAILS.
9. SEE STD. DWG. NO. 715-1A FOR DRIVEWAY DETAILS.
10. LETTER INSIDE ◯ DENOTES DETAIL, STD. DWG. NO. 450-2A.
11. LETTER INSIDE □ DENOTES DETAIL, STD. DWG. NO. 450-2B.

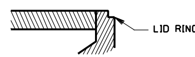


INTERSECTION JOINT LAYOUT

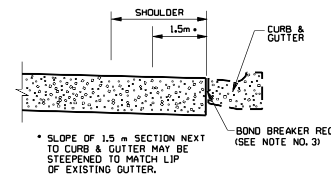


MANHOLE BOXOUT

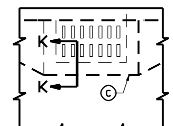
DETAIL J



SECTION J - J

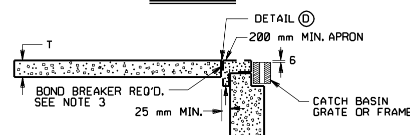


DETAIL L



CATCH BASIN

DETAIL K



SECTION K - K

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

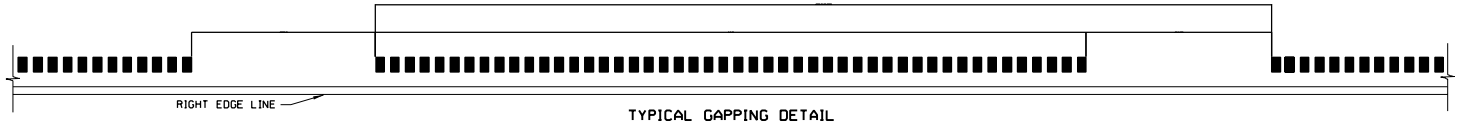
NO.	DATE	APPR.	REMARKS
1	10/27/99	JCB	REMOVED DEFORMED TIE BARS BETWEEN CURB & GUTTER AND PAVEMENT CHANGED DETAIL LETTERS TO MATCH NEW DRAWINGS 450-2A AND 450-2B
2	07/19/00	JCB	REVISED DIMENSIONS ON 'INTERSECTION JOINT LAYOUT' DETAIL.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE APPROVED — AUG.08.2000 DATE
DEPUTY DIRECTOR — AUG.08.2000 DATE

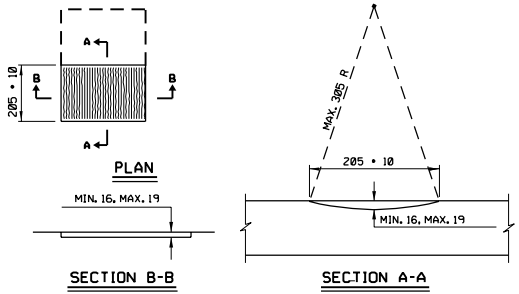
(METRIC)
URBAN CONCRETE PAVEMENT DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
450-3



TYPICAL GAPPING DETAIL

TABLE 1 LONGITUDINAL RUMBLE STRIP APPLICATION			
ROADWAY TYPE	RIGHT SHOULDER WIDTH (RSW)	GROOVE WIDTH (BOTH SHOULDERS)	LOCATION OF RIGHT SHOULDER STRIP
UNDIVIDED	< 1200	150	EDGE LINE
UNDIVIDED	≥ 1200	205	305 mm OFFSET FROM EDGE LINE
DIVIDED	< 1830	205	EDGE LINE OR 100 mm OFFSET
DIVIDED	≥ 1830	305	305 mm OFFSET FROM EDGE LINE

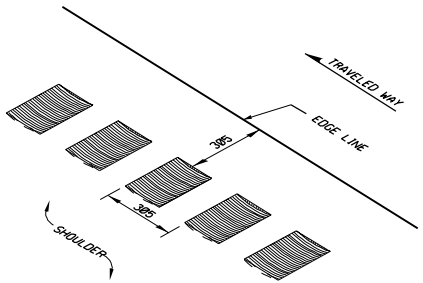


PLAN

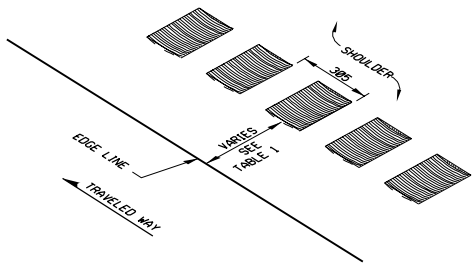
SECTION B-B

SECTION A-A

RUMBLE STRIP DETAILS



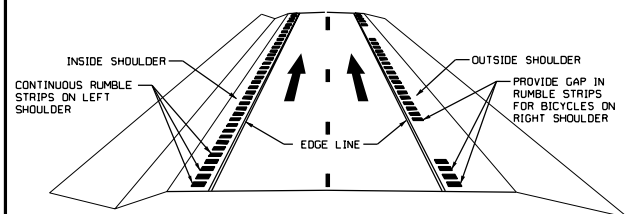
TYPICAL SHOULDER INSTALLATION
LEFT SHOULDER DETAIL



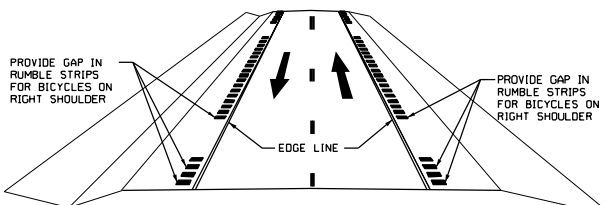
TYPICAL SHOULDER INSTALLATION
RIGHT SHOULDER DETAIL

NOTES:

1. MILL RUMBLE STRIPS TO LEAVE A RECTANGULAR SHAPE WITH UNIFROM EDGES. DO NOT DAMAGE ADJACENT PAVEMENT DURING MILLING OPERATION.
2. DO NOT PLACE RUMBLE STRIPS ON STRUCTURES OR APPROACH SLABS.
3. RESTART RUMBLE STRIP SEQUENCE (48 STRIPS, SKIP 12 STRIPS) WHEN RUMBLE STRIPS ARE HALTED OR INTERRUPTED.



PERSPECTIVE VIEW (MULTI-LANE ROADWAY)



PERSPECTIVE VIEW (TWO-LANE ROADWAY)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	12/11/01	G.S.	DRAWING COMPLETELY REVISED

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: DEC.11.2001 DATE

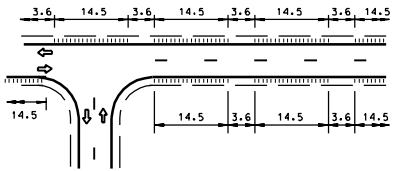
CHAIRMAN STANDARDS COMMITTEE
APPROVED: DEC.11.2001 DATE

DEPUTY DIRECTOR

(METRIC)

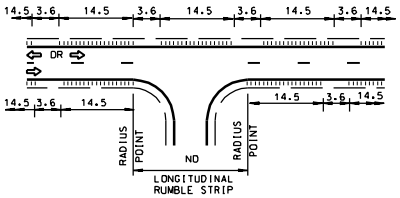
STANDARD DRAWING TITLE: RUMBLE STRIPS

STD. DWG. NO.
460-1



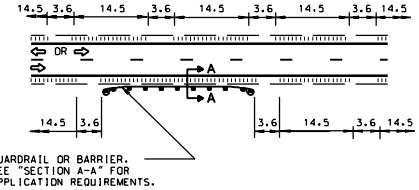
INSTALLATION ON
HIGHWAYS WITH NO ACCESS CONTROL

(SEE NOTE 4)



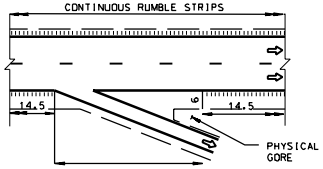
TYPICAL HEAVY USE DRIVEWAY
OR CROSSROAD EXCEPTION DETAIL

USE CONTINUOUS RUMBLE STRIP ON
LEFT SHOULDER IN ONE WAY TRAFFIC
SITUATIONS.

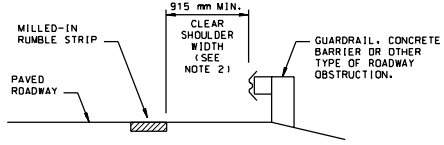


TYPICAL GUARDRAIL AND/OR BARRIER

USE CONTINUOUS RUMBLE STRIP ON
LEFT SHOULDER IN ONE WAY TRAFFIC
SITUATIONS.



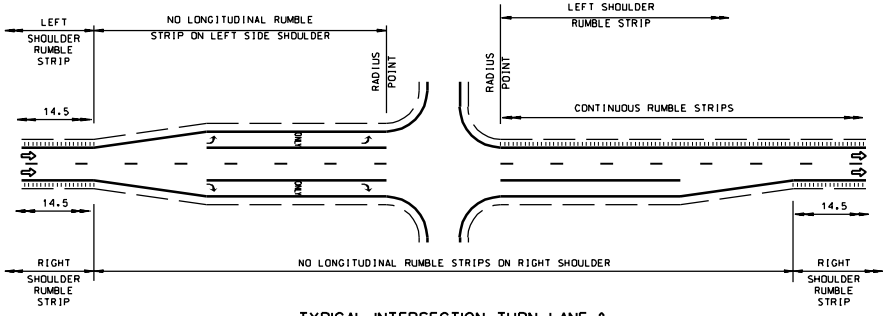
RAMP EXCEPTION DETAIL
ENTRANCE RAMP SIMILAR



SECTION A-A

ROADSIDE BARRIER EXCEPTION

SEE NOTE 3



TYPICAL INTERSECTION, TURN LANE &
ACCELERATION LANE EXCEPTION DETAIL

NOTES:

1. OMIT RUMBLE STRIPS ACROSS PRINCIPAL INTERSECTING ROADWAYS AS PER TYPICALS.
2. IF BICYCLE TRAFFIC EXISTS OR IS ANTICIPATED THEN A MINIMUM EFFECTIVE CLEAR SHOULDER WIDTH OF 915 mm SHOULD BE PROVIDED. APPLY THIS REQUIREMENT TO BOTH SHOULDERS OF UNDIVIDED HIGHWAYS AND THE RIGHT SHOULDER ONLY ON DIVIDED HIGHWAYS.
3. MAINTAIN 915 mm MINIMUM CLEAR SHOULDER WIDTH BETWEEN OBSTRUCTION AND INSIDE EDGE OF RUMBLE STRIP. OTHERWISE ELIMINATE RUMBLE STRIP.
4. ON HIGHWAY WITH NO ACCESS CONTROL PLACE RUMBLE STRIP AS PER STANDARD DRAWING 460-1.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REVISIONS	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC.11.2001 DATE
STANDARDS COMMITTEE
APPROVED — DEC.11.2001 DATE
DEPUTY DIRECTOR

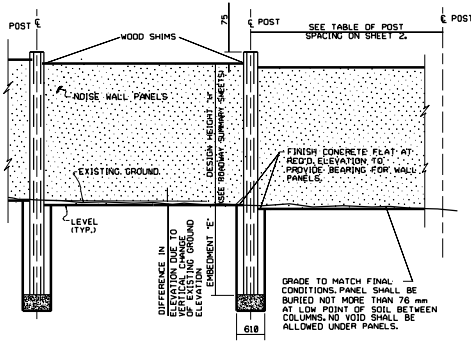
(METRIC)

STANDARD DRAWING TITLE

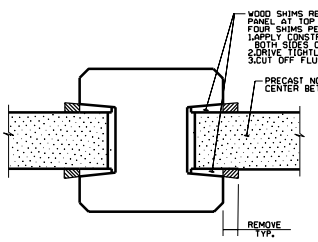
RUMBLE STRIPS - TYPICAL APPLICATION

STD. DWG. NO.

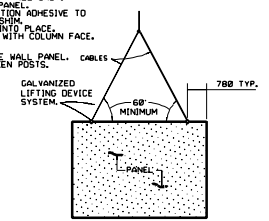
460-2



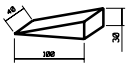
TYPICAL ELEVATION



POST PANEL DETAIL



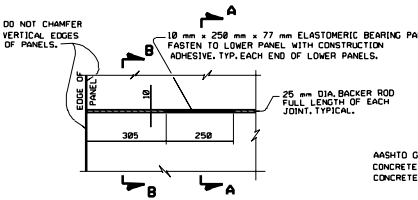
LIFTING DEVICE DETAIL



WOOD SHIM DETAIL

GENERAL NOTES

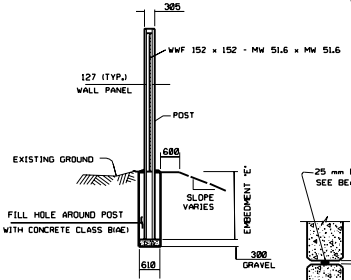
1. CHAMFER EXPOSED CONCRETE CORNERS AS SHOWN.
2. PROVIDE 50 mm COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.
3. SEE ROADWAY PLANS FOR LOCATION AND HEIGHT OF PRECAST NOISE WALL.
4. ALL PANELS ARE 3.820 m LONG AND 127 mm THICK.



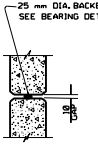
BEARING DETAIL

DESIGN DATA

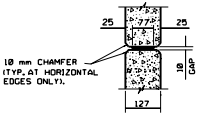
AASHTO GUIDE SPECIFICATIONS FOR STRUCTURAL DESIGN OF SOUND BARRIERS.
CONCRETE CLASS AA(AE) f'_c=34.474 MPa$_{@}$ f_s (REINF.)=165.474 MPa$_{@}$ n=8.
CONCRETE CLASS B(AE) f'_c=17.237 MPa$_{@}$ (FOR HOLES AROUND POSTS ONLY).



TYPICAL SECTION



SECTION B-B



SECTION A-A

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

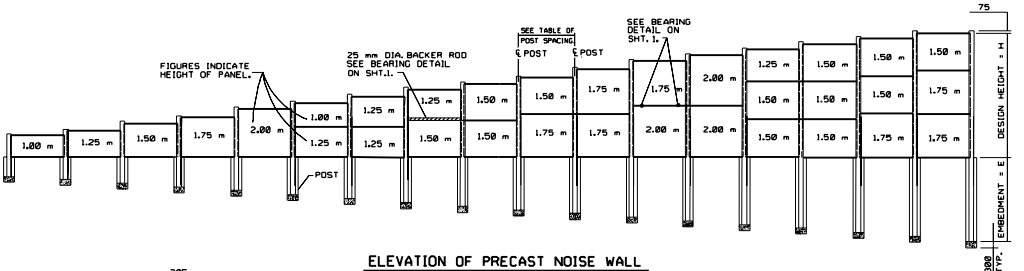
NO.	REVISIONS: CORRECT PAGE NUMBER	APPR.	REMARKS
1	12/22/06		

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

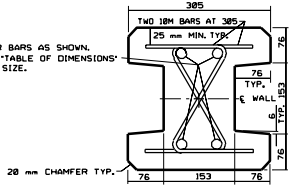
RECOMMENDED FOR APPROVAL: _____ DECEMBER 1998 DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED: _____ DECEMBER 1998 DATE
DEPUTY DIRECTOR

(METRIC)
PRECAST CONCRETE NOISE WALL 1 OF 2
STANDARD DRAWING TITLE

STD. DWG. NO.
545-1

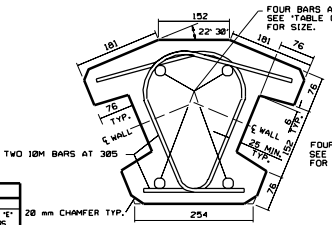


ELEVATION OF PRECAST NOISE WALL



SECTION THRU TYPE I POST

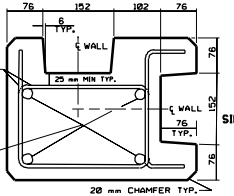
θ = 0° TO 10°



SECTION THRU TYPE II POST

FOR θ = 35° TO 55°

SIDE A



SIDE B

SECTION THRU TYPE III POST

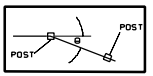
θ= 80° TO 100°

TABLE OF DIMENSIONS (METERS)

DESIGN H	PANEL HEIGHT IN METERS			POST	
IN METERS H	TOP PANEL	CENTER PANEL	BOTTOM PANEL	VERTICAL BAR SIZE	EMBEDMENT "E" IN METERS
1.00	1.00			15M	0.60
1.25	1.25			15M	0.75
1.50	1.50			15M	0.90
1.75	1.75			15M	1.05
2.00	2.00			15M	1.20
2.25	1.00		1.25	15M	1.35
2.50	1.25		1.25	15M	1.50
2.75	1.25		1.50	15M	1.65
3.00	1.50		1.50	20M	1.80
3.25	1.50		1.75	20M	1.95
3.50	1.75		1.75	20M	2.10
3.75	1.75		2.00	25M	2.25
4.00	2.00		2.00	25M	2.40
4.25	1.25	1.50	1.50	25M	2.55
4.50	1.50	1.50	1.50	30M	2.70
4.75	1.50	1.50	1.75	30M	2.85
5.00	1.50	1.75	1.75	30M	3.00

POST SPACING IN METERS

	℄ POST TO ℄ POST	REQ'D SPACING
TYPE I	TO TYPE I	4.00
TYPE I	TO TYPE II	4.85
TYPE I	TO TYPE III SIDE A	4.88
TYPE I	TO TYPE III SIDE B	4.18
TYPE II	TO TYPE II	4.18
TYPE II	TO TYPE III SIDE A	4.85
TYPE II	TO TYPE III SIDE B	4.15
TYPE III SIDE A	TO TYPE III SIDE A	4.88
TYPE III SIDE A	TO TYPE III SIDE B	4.18
TYPE III SIDE B	TO TYPE III SIDE B	4.28



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	BY	REMARKS
1	10/23/98		CORRECTED PAGE NUMBER
2	04/27/99	B.A.J.	CORRECT BAR DESIGNATION

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: APR.27.1999 DATE

APPROVED STANDARDS COMMITTEE

APR.27.1999 DATE

DEPUTY DIRECTOR

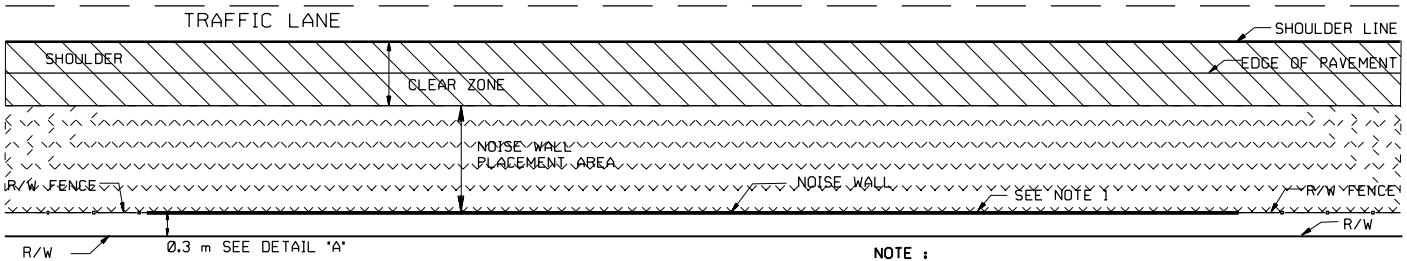
(METRIC)
PRECAST CONCRETE NOISE WALL
2 OF 2

STANDARD DRAWING TITLE

STD. DWG. NO.
S15-2

TYPICAL NOISE WALL PLACEMENT LOCATION

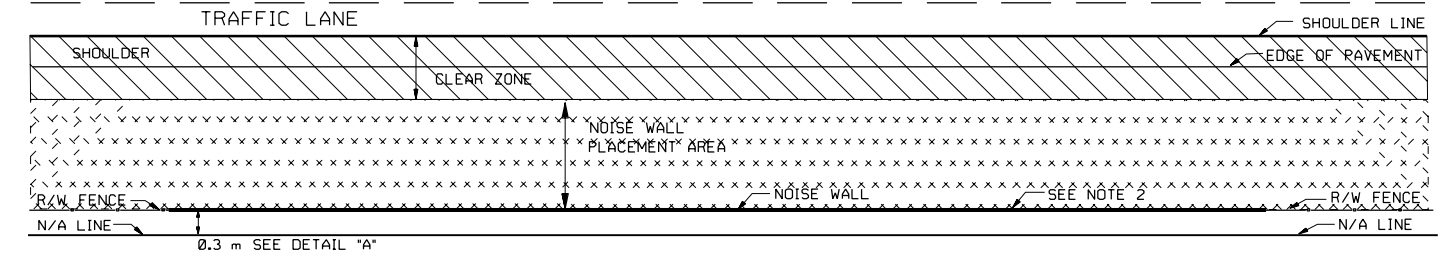
R/W LINE APPLICATION

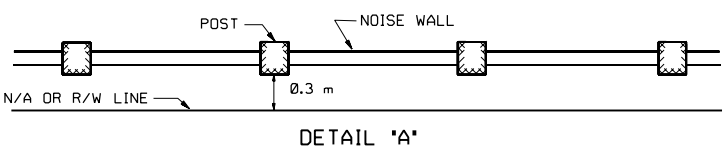


NOTE :

1 - PLACE NOISE WALL A MINIMUM OF Ø.3 m INSIDE R/W LINE AND CONNECT R/W FENCE TO BOTH ENDS OF WALL. IF NOT PLACED Ø.3 m INSIDE R/W LINE, PLACE NO CLOSER THAN 3.5 m FROM R/W LINE FOR MAINTENANCE PURPOSES AND ENVIRONMENTAL CONSIDERATIONS.

N/A LINE APPLICATION





DETAIL "A"

NOTE :

1 - WHEN N/A LINE IS PRESENT, PLACE NOISE WALL A MINIMUM OF Ø.3 m INSIDE N/A LINE AND CONNECT R/W FENCE TO BOTH ENDS OF WALL. IF NOT PLACED Ø.3 m INSIDE R/W LINE, PLACE NO CLOSER THAN 3.5 m FROM R/W LINE FOR MAINTENANCE PURPOSES AND ENVIRONMENTAL CONSIDERATIONS.

2 - DO NOT PLACE NOISE WALLS OUTSIDE N/A LINE.

REVISIONS

NO.	DATE	APPR.	REMARKS

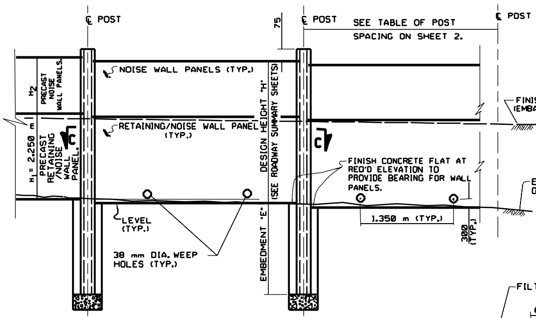
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.13.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR.13.2001 DATE
DEPUTY DIRECTOR

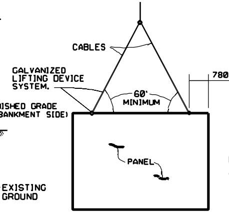
(METRIC)

STANDARD DRAWING TITLE
NOISE WALL PLACEMENT AREA

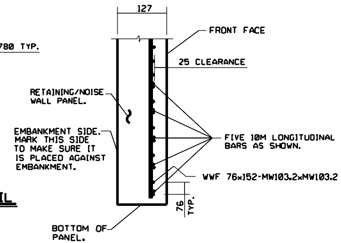
STD. DWG. NO.
545-3



TYPICAL ELEVATION

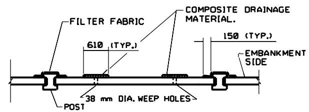


LIFTING DEVICE DETAIL



DETAIL "A"

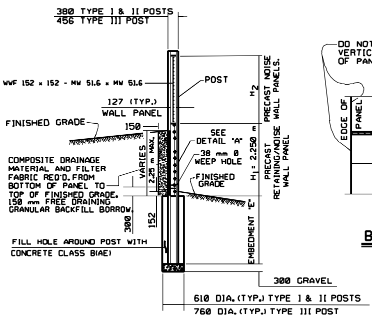
(RETAINING/NOISE WALL PANEL ONLY)



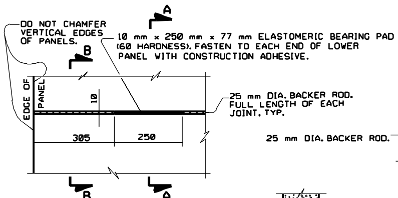
SECTION C-C

GENERAL NOTES

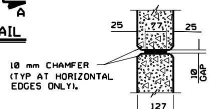
1. CHAMFER EXPOSED CONCRETE CORNERS AS SHOWN.
2. PROVIDE 50 mm COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.
3. SEE ROADWAY PLANS FOR LOCATION AND HEIGHT OF PRECAST RETAINING/ NOISE WALL.
4. ALL PANELS ARE 3.820 m LONG AND 127 mm THICK.



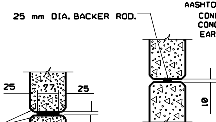
TYPICAL SECTION



BEARING DETAIL



SECTION A-A



SECTION B-B

DESIGN DATA

AASHTO GUIDE SPECIFICATIONS FOR STRUCTURAL DESIGN OF SOUND BARRIERS.

CONCRETE CLASS AA(AE) f'c=34.474 MPa; fs (REINF.)=165.474 MPa; n=8.
CONCRETE CLASS B(AE) f'c=17.237 MPa (FOR HOLES AROUND POSTS ONLY)
EARTH PRESSURE =5.6 kN/m³

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

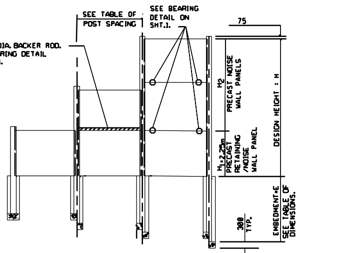
NO.	DATE	APPR.	REMARKS
1	10/26/98		ADDED FREE DRAINING GRANULAR BACKFILL MATERIAL TO TYPICAL SECTION AND CORRECT PAGE NUMBER.
2	01/28/99	B.W.	CORRECTED SIZE OF ELASTOMERIC BEARING PAD IN BEARING DETAIL.
3	04/27/99	B.A.	CORRECT BAR DESIGNATION

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

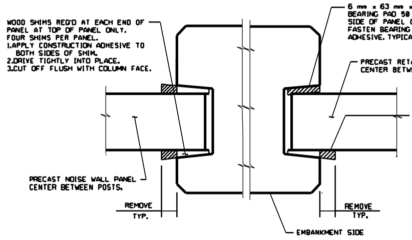
RECOMMENDED FOR APPROVAL — APR.27,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.27,1999 DATE
DEPUTY DIRECTOR

(METRIC)
PRECAST CONCRETE RETAINING/ NOISE WALL 1 OF 2
STANDARD DRAWING TITLE

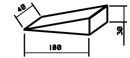
STD. DWG. NO.
546-1



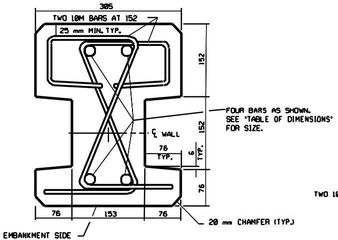
ELEVATION OF PRECAST RETAINING/NOISE WALL



POST/PANEL DETAIL

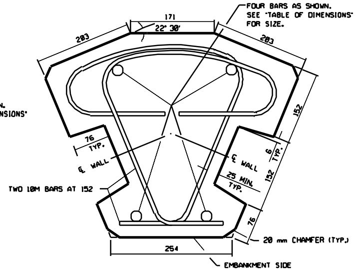


WOOD SHIM DETAIL



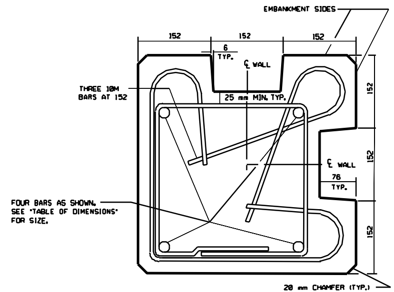
SECTION THRU TYPE I POST

θ=0° TO 10°



SECTION THRU TYPE II POST

θ=35° TO 55°

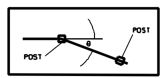


SECTION THRU TYPE III POST

θ=80° TO 100°

TABLE OF DIMENSIONS							
DESIGN H			PANEL HEIGHT IN METERS			POST	
IN METERS							
H1 +	H2 =	H	TOP PANEL	CENTER PANEL	BOTTOM PANEL	VERTICAL BAR SIZE	EMBEDMENT "E" IN METERS
2.25		2.25			2.25	30M	1.8
2.25	1.00	3.25	1.00		2.25	30M	2.6
2.25	1.25	3.50	1.25		2.25	30M	2.8
2.25	1.50	3.75	1.50		2.25	30M	3.0
2.25	1.75	4.00	1.75		2.25	30M	3.2
2.25	2.00	4.25	2.00		2.25	30M	3.4
2.25	2.25	4.50	1.00	1.25	2.25	30M	3.6
2.25	2.50	4.75	1.25	1.25	2.25	30M	3.8
2.25	2.75	5.00	1.25	1.50	2.25	35M	4.0
2.25	3.00	5.25	1.50	1.50	2.25	35M	4.2
2.25	3.25	5.50	1.50	1.75	2.25	35M	4.4
2.25	3.50	5.75	1.75	1.75	2.25	35M	4.6

POST SPACING IN METERS	
℄ POST TO ℄ POST	REQ'D SPACING
TYPE I TO TYPE I	4.00
TYPE I TO TYPE II	4.05
TYPE I TO TYPE III	4.08
TYPE II TO TYPE II	4.10
TYPE II TO TYPE III	4.12



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS				
NO.	DATE	APPR.	REMARKS	
1	04/27/99	B.A.	CORRECT BAR DESIGNATION	

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.27,1999 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.27,1999 DATE

DEPUTY DIRECTOR

(METRIC)

PRECAST CONCRETE RETAINING/ NOISE WALL 2 OF 2

STANDARD DRAWING TITLE

STD. DWG. NO.

546-2

CORRUGATED STEEL PIPE ARCHES
68 mm × 13 mm CORRUGATIONS

PIPE DIM SPAN X RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
425 × 325	76	0.5	1.6	3.4
525 × 375	76	0.5	1.6	2.8
600 × 450	76	0.6	1.6	2.2
700 × 500	76	0.6	1.6	1.6
875 × 600	102	0.8	1.6	1.8
1050 × 725	114	0.8	1.6	1.6
1225 × 825	140	0.8	2.0	1.6
1425 × 950	165	0.8	2.8	1.8
1600 × 1075	178	0.8	2.8	1.6
1775 × 1175	203	0.6	3.5	1.6
1925 × 1300	216	0.6	4.5	1.6
2075 × 1425	229	0.6	4.3	1.6

SEE NOTE 1

ROUND CORRUGATED STEEL PIPE
19 mm × 25 mm SPIRAL RIB PIPE

THICKNESS	1.6 mm		2.0 mm		2.8 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
600	0.3	17.1	0.3	21.3	0.3	30.2
750	0.3	13.7	0.3	17.1	0.3	24.1
900	0.3	11.3	0.3	14.3	0.3	20.1
1050	0.3	9.8	0.3	12.2	0.3	17.1
1200	0.3	8.5	0.3	10.7	0.3	14.9
1350		7.6	0.4	9.5	0.4	13.4
1500		6.7	0.4	8.5	0.4	11.9
1650			0.5	7.6	0.5	11.0
1800			0.5	7.0	0.5	10.1
1950					0.6	9.1
2100					0.6	8.5

CORRUGATED STEEL PIPE ARCHES
76 mm × 25 mm OR 125 mm × 25 mm CORRUGATIONS

PIPE DIM SPAN X RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
1325×1025	178	0.6	2.8	2.2
1500×1150	203	0.6	2.8	2.2
1650×1275	229	0.5	2.8	2.8
1825×1375	305	0.5	2.8	3.1
2025×1475	356	0.5	2.8	3.4
2175×1575	356	0.5	2.8	3.1
2375×1675	406	0.5	2.8	3.4
2575×1775	406	0.6	2.8	3.1
2800×1875	457	0.6	2.8	3.1
2925×1975	457	0.6	2.8	3.1
3200×2075	457	0.6	3.5	2.5
3425×2175	457	0.6	3.5	2.2
3550×2275	457	0.6	4.3	2.2

SEE NOTE 1

CORRUGATED STEEL PIPE ARCHES
152 mm × 51 mm CORRUGATIONS
BOLTED FABRICATION 14 BOLTS/METER 19 mm DIA.

PIPE DIM SPAN X RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
1854 × 1397	450	0.5	2.8	4.9
2134 × 1549	450	0.5	2.8	2.3
2413 × 1702	450	0.5	2.8	3.7
2692 × 1854	450	0.6	2.8	3.4
2972 × 2007	450	0.6	2.8	3.1
3327 × 2159	450	0.6	2.8	2.4
3607 × 2311	450	0.6	2.8	2.1
3912 × 2540	450	0.8	2.8	1.8
4293 × 2667	450	0.8	2.8	1.5
4674 × 2819	550	0.6	3.5	1.8
4826 × 2997	550	0.6	3.5	1.5
5055 × 3074	550	0.6	3.5	1.2
4039 × 2845	800	0.6	2.8	3.7
4318 × 2997	800	0.6	2.8	3.4
4674 × 3150	800	0.6	3.5	3.1
4953 × 3302	800	0.6	3.5	2.7
5232 × 3454	800	0.8	3.5	2.7
5512 × 3607	800	0.8	4.3	2.4
5867 × 3759	800	0.8	4.3	2.1
6071 × 3912	800	0.8	4.3	2.1
6274 × 4013	800	0.9	4.8	2.1

ROUND CORRUGATED STEEL PIPE
68 mm × 13 mm CORRUGATIONS

THICKNESS	1.6 mm		2.0 mm		2.8 mm		3.5 mm		4.3 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
300	0.3	64.9	0.3	21.1	0.3	113.4	0.3	146.0	0.3	178.6
375	0.3	51.8	0.3	64.6	0.3	90.8	0.3	116.7	0.3	143.0
450	0.3	43.3	0.3	54.0	0.3	75.6	0.3	97.2	0.3	119.2
525	0.3	36.9	0.3	46.3	0.3	64.9	0.3	83.5	0.3	102.1
600	0.3	32.3	0.3	40.5	0.3	56.7	0.3	72.9	0.3	89.3
675	0.3	28.7	0.3	36.0	0.3	50.3	0.3	64.9	0.3	79.3
750	0.3	25.9	0.3	32.3	0.3	45.4	0.3	38.2	0.3	71.3
900	0.3	21.6	0.3	26.8	0.3	37.8	0.3	48.5	0.3	59.4
1050	0.3	18.3	0.3	23.2	0.3	32.3	0.3	41.8	0.3	50.9
1200	0.3	16.2	0.3	20.1	0.3	28.4	0.3	36.3	0.3	44.5
1350			0.3	18.0	0.3	25.0	0.3	32.3	0.3	39.6
1500					0.3	22.6	0.3	29.0	0.3	35.7
1650							0.4	26.5	0.3	32.3
1800							0.4	24.1	0.4	29.6
1950									0.4	26.2
2100									0.4	22.9

SEE NOTE 1

ROUND CORRUGATED STEEL PIPE
76 mm × 25 mm CORRUGATIONS

THICKNESS	1.6 mm		2.0 mm		2.8 mm		3.5 mm		4.3 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
900	0.3	24.7	0.3	31.1	0.3	43.6	0.3	56.1	0.3	68.6
1050	0.3	21.3	0.3	26.5	0.3	37.2	0.3	47.9	0.3	58.8
1200	0.3	18.6	0.3	23.3	0.3	32.6	0.3	42.1	0.3	51.5
1350	0.3	16.5	0.3	20.7	0.3	29.0	0.3	37.2	0.3	45.7
1500	0.3	14.9	0.3	18.6	0.3	25.9	0.3	33.5	0.3	41.2
1650	0.4	13.4	0.3	16.8	0.3	23.8	0.3	30.5	0.3	37.2
1800	0.4	12.2	0.4	15.5	0.3	21.6	0.3	28.0	0.3	34.1
1950	0.4	11.3	0.4	14.3	0.3	20.1	0.3	25.9	0.3	31.7
2100	0.5	10.7	0.4	13.1	0.4	18.6	0.3	23.8	0.3	29.3
2250	0.5	9.8	0.4	12.2	0.4	17.4	0.3	22.3	0.3	27.4
2400			0.5	11.6	0.4	16.2	0.4	21.0	0.3	25.6
2550			0.5	11.0	0.5	15.2	0.4	15.2	0.4	24.4
2700					0.4	14.3	0.4	18.6	0.4	22.9
2850					0.5	13.7	0.4	17.7	0.4	21.6
3000					0.5	12.8	0.4	16.8	0.4	20.4
3150							0.5	15.9	0.4	19.5
3300							0.5	15.2	0.5	18.6
3450							0.5	14.6	0.5	17.7
3600									0.5	17.1

SEE NOTE 1

ROUND CORRUGATED STEEL PIPE
125 mm × 25 mm CORRUGATIONS

THICKNESS	1.6 mm		2.0 mm		2.8 mm		3.6 mm		4.3 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
900	0.3	22.0	0.3	27.4	0.3	38.7	0.3	49.7	0.3	61.0
1050	0.3	18.9	0.3	23.5	0.3	33.2	0.3	42.7	0.3	52.1
1200	0.3	16.5	0.3	20.7	0.3	29.0	0.3	37.2	0.3	45.7
1350	0.3	14.6	0.3	18.3	0.3	25.6	0.3	33.2	0.3	40.5
1500	0.3	13.1	0.3	16.5	0.3	23.2	0.3	29.9	0.3	36.6
1650	0.4	11.9	0.3	14.9	0.3	21.0	0.3	27.1	0.3	33.2
1800	0.4	11.0	0.4	13.7	0.3	19.2	0.3	24.7	0.3	30.5
1950	0.4	10.1	0.4	12.5	0.3	17.7	0.3	22.9	0.3	28.0
2100	0.5	9.5	0.4	11.6	0.4	16.5	0.3	21.3	0.3	25.9
2250	0.5	8.8	0.4	11.0	0.4	15.2	0.3	19.8	0.3	24.4
2400			0.5	10.4	0.4	14.3	0.4	18.6	0.3	22.9
2550			0.5	9.8	0.4	13.4	0.4	17.4	0.3	21.3
2700					0.4	12.8	0.4	16.5	0.4	20.1
2850					0.5	12.2	0.4	15.5	0.4	19.2
3000					0.5	11.6	0.4	14.9	0.4	18.3
3150							0.5	14.0	0.4	17.4
3300							0.5	13.4	0.5	16.5
3450							0.5	12.8	0.5	15.9
3600									0.5	15.2

SEE NOTE 1

NOTE 1: TABLE IS FOR PIPE WITH HELICAL LOCK SEAMS OR HELICAL WELDED SEAMS ONLY.

ROUND CORRUGATED STEEL STRUCTURAL PLATE PIPE
152 mm × 51 mm CORRUGATIONS
BOLTED FABRICATION 13 BOLTS/METER 19 mm DIA.THICKNESS

THICKNESS		2.5 mm	3.5 mm	4.5 mm	5.0 mm	5.5 mm	6.5 mm	7.0 mm
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MAX FILL (m)	MAX FILL (m)	MAX FILL (m)	MAX FILL (m)	MAX FILL (m)	MAX FILL (m)
1524	0.3	14.0	20.7	27.4	31.4	37.8	44.5	48.8
1676	0.3	12.8	18.9	24.7	28.4	34.4	40.5	44.2
1829	0.3	11.6	17.4	22.9	26.2	31.4	37.2	40.5
1981	0.3	10.7	15.9	21.0	24.1	29.0	34.1	37.5
2134	0.3	10.1	14.9	19.5	22.3	26.8	31.7	34.8
2286	0.3	9.5	13.7	18.3	20.7	25.0	29.6	32.3
2438	0.3	8.8	13.1	17.1	19.5	23.5	27.7	30.5
2591	0.4	8.2	12.2	15.9	18.3	22.3	26.2	28.7
2743	0.4	7.6	11.6	15.2	17.4	21.0	24.7	26.8
2896	0.4	7.3	11.0	14.3	16.5	19.8	23.5	25.6
3048	0.4	7.0	10.4	13.7	15.5	18.9	22.3	24.4
3200	0.4	6.7	9.8	12.8	14.9	18.0	21.0	23.2
3353	0.5	6.4	9.5	12.2	14.0	17.1	20.1	22.0
3505	0.5	6.1	8.8	11.9	13.4	16.5	19.2	21.0
3658	0.5	5.8	8.5	11.3	13.1	15.5	18.6	20.1
3810	0.5	5.5	8.2	11.0	12.5	14.9	17.7	19.5
3962	0.5	5.2	7.9	10.4	11.9	14.3	17.1	18.6
4115	0.6	5.2	7.6	10.1	11.6	14.0	16.5	18.0
4267	0.6	4.9	7.3	9.8	11.0	13.4	15.9	17.4
4420	0.6	4.9	7.0	9.5	10.7	12.8	15.2	16.8
4572	0.6	4.6	6.7	9.1	10.4	12.5	14.6	16.2
4724	0.6	4.6	6.7	8.8	10.1	12.2	14.3	15.5
4877	0.6		6.4	8.5	9.8	11.6	13.7	15.2
5029	0.7		6.1	8.2	9.5	11.3	13.4	14.6
5182	0.7		6.1	7.9	9.1	11.0	13.1	14.3
5334	0.7		5.2	7.6	8.8	10.7	12.8	13.7
5486	0.7			7.6	8.5	10.4	12.5	13.4
5639	0.7			7.3	8.2	10.1	12.2	13.1
5791	0.8			7.0	8.2	9.8	11.9	12.8
5944	0.8			7.0	7.9	9.5	11.6	12.5
6096	0.8				7.6	9.5	11.3	12.2
6248	0.8				7.6	9.1	11.0	11.9
6401	0.8					8.8	10.7	11.6
6553	0.9					8.5	10.4	11.3
6706	0.9					8.5	10.4	11.0
6858	0.9					8.2	10.1	10.7
7010	0.9						9.8	10.4
7163	0.9						9.8	10.4
7315	0.9						9.5	10.1
7468	1.00							9.8
7620	1.00							9.8
7772	1.00							9.5

STRUCTURAL STEEL UNDERPASS
152 mm × 51 mm CORRUGATIONS

PIPE DIM SPAN X RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
3708×3353	965	0.6	2.5	3.3
4013×3607	965	0.6	2.5	3.0
4293×3912	965	0.6	2.5	2.9
4521×4267	965	0.6	2.5	2.9
4801×4597	965	0.6	2.5	2.2
5004×4877	965	1.0	3.5	2.1
5258×5182	1194	1.0	3.5	2.6
5817×5232	1194	1.0	4.5	2.2
6198×5410	1194	1.0	5.0	1.8

REVISIONS

NO.	DATE	APPROVAL	REMARKS
1	12/14/98	FRW	CORRECTED SHEET NUMBER.
2	11/11/00	DS	REVISED ALL TABLES. ELIMINATED RIVETS AND SPOT WELDS AND ADDED STRUCTURAL STEEL UNDERPASS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE APPROVED — NOV.14,2000 DATE

DEPUTY DIRECTOR — NOV.14,2000 DATE

STANDARD DRAWING TITLE
(METRIC)
FILL HEIGHT FOR METAL PIPE (STEEL)

STD. DWG. NO.
605-1

CORRUGATED ALUMINUM PIPE ARCHES
68 mm x 13 mm CORRUGATIONS

PIPE DIM SPAN x RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
425x325	76	0.5	1.5	3.4
525x375	76	0.5	1.5	2.7
600x450	76	0.6	1.5	2.1
700x500	76	0.6	1.5	1.5
875x600	102	0.8	1.5	1.8
1050x725	114	0.8	1.5	1.5
1225x825	140	0.8	1.9	1.5
1425x950	165	0.8	3.4	1.8
1600x1075	178	0.8	3.4	1.5
1775x1175	203	0.6	4.2	1.5

SEE NOTE 1

CORRUGATED ALUMINUM PIPE ARCHES
76 mm x 25 mm CORRUGATIONS

PIPE DIM SPAN x RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
1325x1025	178	0.6	2.7	2.1
1500x1150	203	0.6	2.7	2.1
1650x1275	229	0.5	2.7	2.7
1825x1375	305	0.5	2.7	3.0
2025x1475	356	0.5	2.7	3.4
2175x1575	356	0.5	2.7	3.0
2375x1675	406	0.5	2.7	3.4
2575x1775	406	0.6	3.4	3.0
2800x1875	457	0.6	3.4	3.0
2925x1975	457	0.6	4.2	3.0

FOR 2.67 THRU 4.2 mm THICKNESSES USE 13 mm DIA BOLTS

SEE NOTE 1

CORRUGATED ALUMINUM PIPE ARCHES
229 mm x 64 mm CORRUGATIONS
BOLTED FABRICATION

PIPE DIM SPAN x RISE (mm)	CORNER RADIUS (mm)	MIN COVER (m)	MIN THICKNESS (mm)	MAX FILL HEIGHT (m)
1803x1651	808	0.4	2.5	7.3
1981x1753	808	0.4	2.5	6.7
2210x1829	808	0.4	2.5	6.1
2413x1930	808	0.5	2.5	5.5
2616x2007	808	0.5	2.5	5.2
2819x2083	808	0.5	2.5	4.6
3073x2159	808	0.6	2.5	4.3
3251x2261	808	0.6	2.5	4.0
3505x2337	808	0.6	2.5	3.7
3683x2413	808	0.6	3.2	4.3
3912x2515	808	0.6	3.8	4.0
4140x2591	808	0.6	3.8	3.7
4242x2870	808	0.6	3.8	3.7
4470x2946	808	0.6	4.5	3.4
4674x3048	808	0.6	4.5	3.1
4902x3150	808	0.6	5.1	3.1
5105x3251	808	0.7	5.1	2.7
5258x3353	808	0.7	5.7	2.7
5486x3454	808	0.7	5.7	2.7
5690x3505	808	0.7	6.4	2.4

USE 18 BOLTS/METER-M20 STEEL OR ALUMINUM

ROUND CORRUGATED ALUMINUM PIPE
76 mm x 25 mm CORRUGATIONS

THICKNESS	1.5 mm		1.9 mm		2.7 mm		3.4 mm		4.2 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
900	0.3	18.0	0.3	22.6	0.3	30.8	0.3	40.5	0.3	43.7
1050	0.3	15.2	0.3	19.2	0.3	27.1	0.3	34.8	0.3	42.7
1200	0.3	13.4	0.3	16.8	0.3	23.8	0.3	30.5	0.3	37.2
1350	0.3	11.9	0.4	14.9	0.4	21.0	0.4	22.0	0.3	33.2
1500	0.4	10.7	0.4	13.4	0.4	18.9	0.4	26.6	0.3	29.8
1650	0.5	9.8	0.5	12.2	0.5	17.1	0.4	22.8	0.3	27.1
1800	0.5	8.8	0.5	11.3	0.5	15.8	0.4	20.4	0.4	24.7
1950			0.5	10.4	0.5	15.0	0.5	18.6	0.4	22.9
2100					0.6	13.8	0.5	17.4	0.5	21.3
2350					0.6	12.8	0.5	16.2	0.5	19.8
2400					0.6	12.6	0.6	14.9	0.5	18.3
2550							0.6	13.6	0.6	16.5
2700							0.6	12.2	0.6	14.9
2850									0.6	13.4
3000									0.6	12.2

SEE NOTE 1

ROUND CORRUGATED ALUMINUM STRUCTURAL PLATE PIPE
299 mm x 64 mm CORRUGATIONS
BOLTED FABRICATION 18 BOLTS/METER M20

THICKNESS	2.5 mm		3.2 mm		3.8 mm		4.5 mm		5.1 mm		5.7 mm		6.5 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
1524	0.3	8.8 9.4	0.3	11.6 13.7	0.3	14.9 18.3	0.3	17.7 21.3	0.3	17.7 24.7	0.3	17.7 28.0	0.3	17.7 31.4
1676	0.3	7.9 8.5	0.3	10.7 12.5	0.3	13.4 16.5	0.3	16.2 19.5	0.3	16.2 22.6	0.3	16.2 25.6	0.3	16.2 28.7
1829	0.4	7.3 7.6	0.3	9.8 11.3	0.3	12.5 15.2	0.3	14.6 17.7	0.3	14.6 20.4	0.3	14.6 23.5	0.3	14.6 26.2
1981	0.4	6.7 7.0	0.3	8.8 10.7	0.3	11.3 14.0	0.3	13.7 16.5	0.3	13.7 18.9	0.3	13.7 21.6	0.3	13.7 24.1
2134	0.4	6.1 6.7	0.4	8.2 9.8	0.3	10.7 12.2	0.3	12.5 15.2	0.3	12.5 17.7	0.3	12.5 20.1	0.3	12.5 23.3
2286	0.4	5.8 6.1	0.4	7.6 9.1	0.4	9.8 12.2	0.3	11.9 14.3	0.3	11.9 16.5	0.3	11.9 18.6	0.3	11.9 20.7
2438	0.5	5.5 5.8	0.4	7.3 8.5	0.4	9.1 11.3	0.4	11.0 13.4	0.3	11.0 15.2	0.3	11.0 17.4	0.3	11.0 19.5
2591	0.5	5.2 5.5	0.4	6.7 7.9	0.4	8.8 10.7	0.4	10.4 12.5	0.4	10.2 14.3	0.4	10.4 16.5	0.4	10.4 18.3
2743	0.5	4.9 5.2	0.5	6.4 7.6	0.4	8.2 10.1	0.4	9.8 11.9	0.4	9.8 13.7	0.4	9.8 15.5	0.4	9.8 17.4
2896	0.5	4.6 4.9	0.5	6.1 7.0	0.4	7.6 9.4	0.4	9.8 11.3	0.4	9.1 12.8	0.4	9.1 14.6	0.4	9.1 16.5
3048	0.6	4.3 4.6	0.5	5.8 6.7	0.5	7.3 9.0	0.4	8.8 10.7	0.4	8.8 12.2	0.4	8.8 14.0	0.4	8.8 15.5
3200	0.6	4.0 4.3	0.5	5.5 6.4	0.5	7.0 8.5	0.5	8.2 10.1	0.4	8.2 11.6	0.4	8.2 13.4	0.4	8.2 14.9
3353	0.6	4.0 4.3	0.6	5.2 6.1	0.5	0.0 0.0	0.5	7.9 9.8	0.5	7.9 11.3	0.5	7.9 12.8	0.5	7.9 14.3
3505	0.6	3.7 4.0	0.6	4.9 5.8	0.5	0.0 0.0	0.5	7.6 9.1	0.5	7.6 10.7	0.5	7.6 00.0	0.5	7.6 13.4
3658	0.7	3.7 3.7	0.6	4.9 5.5	0.6	0.0 0.0	0.5	7.3 8.8	0.5	7.3 10.1	0.5	7.3 11.6	0.5	7.3 13.1
3810			0.6	4.6 5.5	0.6	0.0 0.0	0.5	7.0 8.5	0.5	7.0 9.8	0.5	7.0 11.0	0.5	7.0 12.5
3962			0.6	4.3 5.2	0.6	5.5 7.0	0.6	6.7 8.2	0.5	6.7 9.4	0.5	6.7 10.7	0.5	6.7 11.9
4115					0.6	5.5 6.7	0.6	6.4 7.9	0.6	6.4 9.1	0.6	6.4 10.4	0.6	6.4 11.6
4267					0.6	5.2 6.4	0.6	6.1 7.6	0.6	6.1 8.8	0.6	6.1 10.1	0.6	6.1 11.0
4420					0.7	5.2 6.1	0.6	6.1 7.3	0.6	6.1 8.5	0.6	6.1 9.4	0.6	6.1 10.7
4572							0.6	5.8 7.0	0.6	5.8 8.2	0.6	5.8 9.1	0.6	5.8 10.4
4724							0.7	5.5 6.7	0.6	5.5 7.9	0.6	5.5 8.8	0.6	5.5 10.1
4877									0.6	5.5 7.6	0.6	5.5 8.5	0.6	5.5 9.8
5020									0.6	5.2 7.3	0.7	5.5 8.5	0.6	5.2 9.4
5182									0.7	5.2 7.0	0.7	5.2 8.2	0.7	5.2 9.0
5334											0.7	4.9 7.9	0.7	4.9 8.8
5486											0.7	4.9 7.6	0.7	4.9 8.5
5639													0.7	4.6 8.2
5794													0.8	4.6 8.6

10.4 — UPPER FIGURE FOR PIPE WITH ALUMINUM BOLTS
14.3 — LOWER FIGURE FOR PIPE WITH STEEL BOLTS

ROUND CORRUGATED ALUMINUM PIPE
19 mm x 19 mm x 191 mm CORRUGATIONS
SPIRAL RIB PIPE

THICKNESS	1.5 mm		1.9 mm		2.7 mm		3.4 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
450	0.3	16.8	0.3	23.2				
525	0.3	14.3	0.3	19.8	0.3	32.0		
600	0.3	12.5	0.3	17.4	0.3	28.0		
750	0.4	10.1	0.3	13.7	0.3	22.3		
900	0.5	8.2	0.4	11.6	0.3	18.6	0.3	26.2
1050			0.5	9.8	0.4	15.8	0.3	22.6
1200					0.5	14.0	0.4	19.8
1350					0.6	12.2	0.4	17.4
1500					0.6	11.0	0.5	15.8
1650							0.6	14.3
1800							0.6	13.1

FOR HEAVY CONSTRUCTION LOADS (4448 KN AXLE LOAD)
AT LEAST 1.2 m OF COMPACTION COVER IS NEEDED

ROUND CORRUGATED ALUMINUM PIPE
132 mm x 25 mm CORRUGATIONS

THICKNESS	1.50 mm		1.90 mm		2.70 mm		3.40 mm		4.20 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
750	0.3	18.9	0.3	23.5	0.3	32.9	0.3	42.4	0.3	51.8
900	0.3	15.5	0.3	19.5	0.3	27.4	0.3	35.4	0.3	43.3
1050	0.3	13.4	0.3	16.8	0.3	23.5	0.3	30.2	0.3	36.9
1200	0.3	11.6	0.3	14.6	0.3	20.4	0.3	26.5	0.3	32.3
1350	0.4	10.4	0.4	13.1	0.4	18.3	0.4	23.5	0.3	28.7
1500	0.4	9.4	0.4	11.6	0.4	16.5	0.4	21.0	0.4	25.9
1650	0.5	8.5	0.5	10.7	0.5	14.9	0.4	19.3	0.4	23.5
1800	0.5	7.6	0.5	9.8	0.5	13.7	0.5	17.7	0.4	21.6
1950			0.5	8.8	0.5	12.5	0.5	16.2	0.4	19.8
2100					0.6	11.6	0.5	14.9	0.5	18.3
2250							0.6	14.0	0.5	17.1
2400							0.6	13.1	0.5	16.2
2550							0.6	12.2	0.6	14.9
2700									0.6	13.4
2850									0.6	12.2

SEE NOTE 1

ROUND CORRUGATED ALUMINUM PIPE
68 mm x 13 mm CORRUGATIONS

THICKNESS	1.50 mm		1.90 mm		2.70 mm		3.40 mm		4.20 mm	
PIPE DIAMETER (mm)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)	MIN COVER (m)	MAX FILL (m)
300	0.3	47.2	0.3	58.8	0.3	82.6	0.3	106.1	0.3	129.8
375	0.3	39.8	0.3	46.9	0.3	65.8	0.3	85.0	0.3	103.6
450	0.3	31.4	0.3	39.3	0.3	54.9	0.3	70.7	0.3	86.6
525	0.3	26.8	0.3	33.5	0.3	46.9	0.3	60.7	0.3	74.1
600	0.3	23.5	0.3	29.3	0.3	41.1	0.3	53.0	0.3	64.9
675	0.3	20.7	0.3	26.2	0.3	36.6	0.3	47.2	0.3	57.6
750	0.3	18.9	0.3	23.5	0.3	33.9	0.3	42.4	0.3	51.8
900	0.3	15.5	0.3	18.5	0.3	27.4	0.3	35.4	0.3	43.3
1050	0.3	13.4	0.3	16.8	0.3	23.5	0.3	30.2	0.3	36.9
1200					0.3	20.1	0.3	26.2	0.3	32.3
1350					0.4	16.5	0.4	21.3	0.4	26.5
1500							0.4	17.4	0.4	21.6
1600									0.4	17.4
1800									0.5	13.7

SEE NOTE 1

NOTE 1: TABLE IS FOR PIPE WITH HELICAL LOCK SEAMS OR HELICAL WELDED SEAMS ONLY.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	08/31/00	DS	CHANGED SHEET NUMBER FROM 605-1A TO 605-2 AND REVISED ENTIRE DRAWING.
2	11/21/00	DS	DELETED RIVETS AND SPOT WELDING.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — NOV.14,2000 — DATE

APPROVED

DEPUTY DIRECTOR — NOV.14,2000 — DATE

(METRIC)
FILL HEIGHT FOR METAL PIPE (ALUMINUM)
STANDARD DRAWING TITLE

STD. DWG. NO.
605-2

HIGH DENSITY POLYETHYLENE (HDPE) PLASTIC ROUND PIPE CULVERT
FILL HEIGHT TABLES

CORRUGATED			
PIPE SIZE DIA. (mm)	MIN. COVER		MAX. FILL HEIGHT (m)
	(A) (m)	(m)	
450	0.6	0.6	9
600	0.6	0.8	9
750	0.6	1.0	9
900	0.6	1.2	9

NOTE (A) FLOWABLE FILL PROVIDE ADEQUATE FLOTATION RESISTANCE, JOINTS SHALL HAVE GASKETS.

RIBBED - SMOOTH LINED			
PIPE SIZE DIA. (mm)	MIN. COVER		MAX. FILL HEIGHT (m)
	(A) (m)	(m)	
450	0.6	0.6	7.3
600	0.6	0.8	7.3
750	0.6	1.0	7.3
900	0.6	1.2	7.3

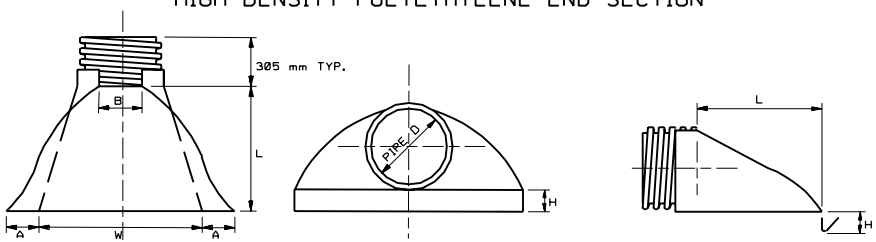
SMOOTH WALL (SOLID WALL)							
PIPE SIZE DIA. (mm)	MIN. COVER		MINIMUM WALL THICKNESS IN (mm)				
	(A) (m)	(m)	15.4	21.7	23.4	29.3	35.2
			MAX. FILL HEIGHT (m)				
450	0.6	0.6		14.0			
600	0.6	0.8			10.3		
750	0.6	1.0				10.3	
900	0.6	1.2					10.3

POLYVINYL CHLORIDE (PVC) PLASTIC ROUND PIPE CULVERT

FILL HEIGHT TABLE

RIBBED - SMOOTH LINED			
PIPE SIZE DIA. (mm)	MIN. COVER		MAX. FILL HEIGHT (m)
	(A) (m)	(m)	
450	0.6	0.6	8.2
600	0.6	0.8	7.6
750	0.6	1.0	7.0
900	0.6	1.2	6.7

HIGH DENSITY POLYETHYLENE END SECTION



TOP VIEW END VIEW SIDE VIEW

PIPE DIAMETER (mm)	DIMENSIONS IN MILLIMETERS				
	A(25±)	B MAX	H(25±)	L(13±)	W(50±)
450	191	381	165	813	889
600	191	457	165	914	1143
750	267	N/A	178	1346	1727
900	267	N/A	178	1346	1727

NOTE: 1. IN ORDER TO ASSURE PROPER FIT WITH 750 mm AND 900 mm THESE END SECTIONS ARE ATTACHED BY WELDING TO A SHORT STUB OF 750 mm OR 900 mm PIPE AND REQUIRE A STANDARD CONNECTING BAND TO MAKE THE ATTACHMENT.

2. DO NOT USE THESE CULVERT END SECTIONS WITHIN THE CLEAR ZONE.

CLEAR ZONE - THE TOTAL ROADSIDE BORDER AREA, STARTING AT THE EDGE OF THE TRAVELED WAY, AVAILABLE FOR SAFE USE BY ERRANT VEHICLES. THIS AREA MAY CONSIST OF A SHOULDER, A RECOVERABLE SLOPE, A NON-RECOVERABLE SLOPE, AND/OR A CLEAR RUN-OUT AREA. THE DESIRED WIDTH IS DEPENDENT UPON THE TRAFFIC VOLUMES AND SPEEDS, AND ON THE ROADSIDE GEOMETRY.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE SHOWN.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	08/21/08	DS	CHANGED SHEET NUMBER FROM 605-28 TO 605-3 AND REVISED ENTIRE DRAWING.
2	04/18/01	BA	ARROW HEADS ADDED TO DETAIL, NO OTHER CHANGES.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10.2001 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — DATE
DEPUTY DIRECTOR — APR.10.2001 DATE

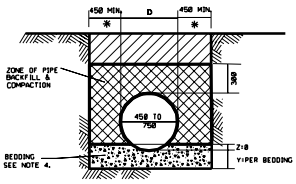
(METRIC)

HDPE END SECTION AND FILL HEIGHTS FOR PLASTIC ROUND PIPE CULVERT

STANDARD DRAWING TITLE

STD. DWG. NO.
605-3

BACKFILL / BEDDING REQUIREMENTS FOR PLASTIC PIPE, METAL PIPE & PIPE ARCH CULVERTS

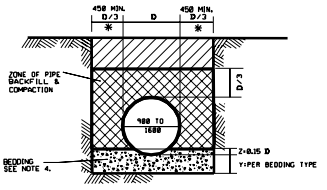


FOR TYPE I BEDDING Y=200
FOR TYPE II BEDDING Y=300
FOR TYPE III BEDDING Y=600

* INCREASE THIS DIMENSION TO D IF PIPE IS PLACED IN AN EMBANKMENT WITHOUT THE BENEFIT OF TRENCHING

DETAIL "A"

FOR CIRCULATOR PIPE
HAVING DIAMETERS LESS THAN 900 mm

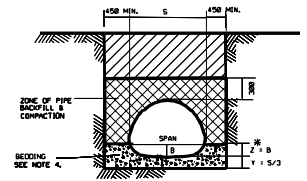


FOR TYPE I BEDDING Y=200
FOR TYPE II BEDDING Y=300
FOR TYPE III BEDDING Y=600

* INCREASE THIS DIMENSION TO D IF PIPE IS PLACED IN AN EMBANKMENT WITHOUT THE BENEFIT OF TRENCHING

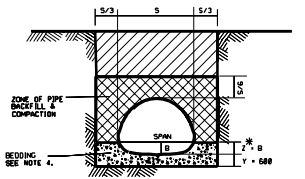
DETAIL "C"

FOR CIRCULATOR PIPE
HAVING DIAMETERS BETWEEN 900 mm AND 1800 mm INCLUSIVE



DETAIL "B"

FOR ARCH PIPE
HAVING SPANS LESS THAN 1800 INCLUSIVE



DETAIL "D"

FOR ARCH PIPE
HAVING SPANS OF 1850 AND LARGER

* Z = DEPTH OF BEDDING AT INVERT IS TO THE WIDEST POINT ON THE PIPE ARCH CULVERT.

LEGEND:

: BEDDING MATERIAL SHALL BE ON SITE MATERIAL OR GRANULAR BACKFILL BORROW (50mm MAX.) AS REQ'D IN ACCORDANCE WITH THE TYPE OF BEDDING I,II, OR III) MEETING THE FOLLOWING REQUIREMENTS:

A. ON-SITE MATERIAL EXCLUDING UNSTABLE SOIL AS DEFINED BELOW.

B. GRANULAR BACKFILL BORROW SHALL NOT BE ALL ONE SIZE BUT HAVE INTERMEDIATE FRACTIONS FROM NO. 75µm TO 50mm MAXIMUM MATERIAL.

: ZONE OF PIPE BACKFILL & COMPACTION. USE ON-SITE MATERIAL CONTAINING NO ROCK LARGER THAN 50mm IN SIZE & FREE OF FROZEN LUMPS OR CLAY.

FLOWABLE FILL MAY BE USED FOR BACKFILL AND BEDDING.

GENERAL INSTALLATION NOTES:

1. PRECOMPACTION & COMPACTION SHALL BE IN ACCORDANCE WITH AASHTO T-99 WITH DENSITY NOT LESS THAN 96 PERCENT OF LABORATORY DENSITY.
2. BEDDING DETAIL AS SHOWN IS FOR USE WITH UDOT's STANDARD DRAWINGS 605-1, 605-2 & 605-3
3. RECESS THE BEDDING TO RECEIVE CULVERT JOINTS WHERE APPLICABLE.
4. HAUNCH AREAS UNDER PIPE MUST BE IN FIRM AND INTIMATE CONTACT WITH THE ENTIRE BOTTOM SURFACE OF THE PIPE WITHOUT DISTURBING THE PIPE FROM SPECIFIED LINE AND GRADE.
5. THE WIDTH OF THE TRENCH BOX, OR OTHER SHIELD, MUST EXCEED THE REQUIRED WIDTH OF THE BACKFILL IN THE BEDDING AND BACKFILL ZONES.

TABLE 1

TYPE OF BEDDING	TYPE OF SOIL FOUNDATION	TYPE OF BEDDING MATERIAL
TYPE I	OTHER THAN ROCK OR UNSTABLE SOILS	ON-SITE MATERIAL TO BE PRECOMPACTED
TYPE II	ROCK	ON - SITE MATERIAL
TYPE III	UNSTABLE	GRANULAR BACKFILL BORROW (50 MAX.)

UNSTABLE SOILS : FOUNDATION CONSISTING OF ALL ORGANIC SOILS OR MATERIALS SUCH AS PEAT, MOSS & BOG, OR FINE GRAINED SOILS (SILTS OR CLAYS) AND UNCEMENTED SANDS WHOSE WATER CONTENT EXCEEDS THEIR LIQUID LIMIT. SUCH SOILS WILL REQUIRE THAT A "TYPE III" BEDDING BE USED.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
1	08/31/98	DS	CHANGED SHEET NUMBER FROM 605-5 TO 605-4 AND REVISED ENTIRE DRAWING
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — NOV.14,2000 DATE
CHAIRMAN STANDARDS COMMITTEE
DEPUTY DIRECTOR — NOV.14,2000 DATE

(METRIC)

PLASTIC PIPE, METAL PIPE OR PIPE ARCH CULVERT BEDDING

STANDARD DRAWING TITLE

STD. DWG. NO.
605-4

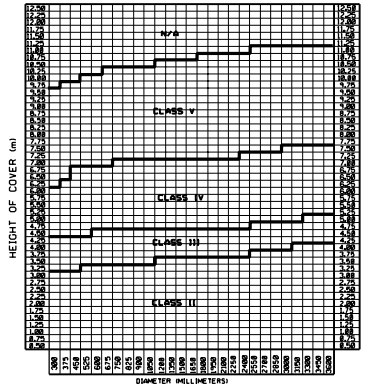
NOTES:

1. PRECOMPACTION & COMPACTION SHALL BE IN ACCORDANCE WITH AASHTO T-99
2. RECESS THE BEDDING TO RECEIVE CULVERT JOINTS WHERE APPLICABLE.
3. HAUNCH AREAS UNDER PIPE MUST BE IN FIRM AND INTIMATE CONTACT WITH THE ENTIRE BOTTOM SURFACE OF THE PIPE WITHOUT DISTURBING THE PIPE FROM SPECIFIED LINE AND GRADE.
4. THE MINIMUM HEIGHT (H) OF FILL BETWEEN THE TOP OF THE CULVERT AND BOTTOM OF ROADWAY SURFACING SHALL BE 300 mm FOR REINFORCED AND NON-REINFORCED CONCRETE PIPES.
5. A MINIMUM 600 mm OF COVER FOR REINFORCED AND 1200 mm OF COVER FOR NON-REINFORCED PIPE SHALL BE MAINTAINED DURING CONSTRUCTION.

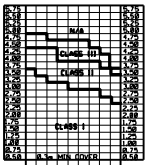
INSTALLATION SOILS AND MINIMUM COMPACTION REQUIREMENTS

TYPE OF BEDDING	TYPE OF SOIL FOUNDATION	BEDDING THICKNESS	HAUNCH & OUTER BEDDING	LOWER SIDE
TYPE I	OTHER THAN ROCK OR UNSTABLE SOILS.	Do/24 BUT NOT LESS THAN 150 mm	95 % A1,A3	90 % A1,A3 OR 95 % A2,A4 OR 100 % A5,A6 OR NATURAL SOILS OF EQUAL FIRMNESS
TYPE II	ROCK	Do/12 BUT NOT LESS THAN 300 mm	95 % A1,A3	90 % A1,A3 OR 95 % A2,A4 OR 100 % A5,A6 OR NATURAL SOILS OF EQUAL FIRMNESS
TYPE III	UNSTABLE *	NOT LESS THAN 300 mm	95 % A1,A3	90 % A1,A3 OR 95 % A2,A4 OR 100 % A5,A6 OR NATURAL SOILS OF EQUAL FIRMNESS

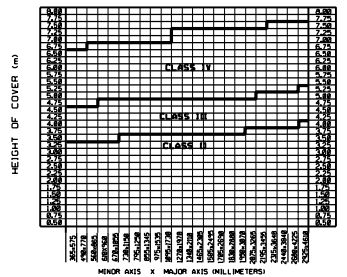
* UNSTABLE SOIL FOUNDATION : FOUNDATION CONSISTING OF ORGANIC SOILS OR MATERIALS SUCH AS PEAT, MOSS & MOL, OR FINE GRAINED SOILS (SILTS OR CLAYS) AND UNCEMENTED SANDS WHOSE WATER CONTENT EXCEEDS THEIR LIQUID LIMIT. SUCH SOILS WILL REQUIRE THAT A 'TYPE III' BEDDING BE USED.



REINFORCED CIRCULAR PIPE FILL HEIGHT TABLE



NON-REINFORCED CIRCULAR PIPE FILL HEIGHT TABLE



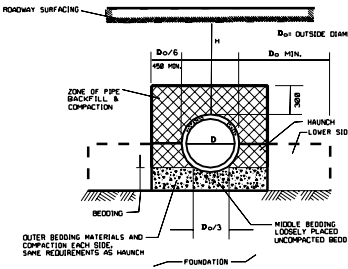
HORIZONTAL ELLIPTICAL PIPE FILL HEIGHT TABLE

LEGEND:

* BEDDING MATERIAL SHALL BE ON SITE MATERIAL OR GRANULAR BACKFILL BORROW (50mm MAX.) AS REQ'D IN ACCORDANCE WITH THE TYPE OF BEDDING (I, II, OR III) MEETING THE FOLLOWING REQUIREMENTS:
  - A. ON-SITE MATERIAL EXCLUDING UNSTABLE SOIL AS DEFINED BELOW.
  - B. GRANULAR BACKFILL BORROW SHALL NOT BE ALL ONE SIZE BUT HAVE INTERMEDIATE FRACTIONS FROM NO. 75um TO 50mm MAXIMUM MATERIAL.

* ZONE OF PIPE BACKFILL & COMPACTION. USE ON-SITE MATERIAL CONTAINING NO ROCK LARGER THAN 50mm IN SIZE & FREE OF FROZEN LUMPS OR CLAY.

BACKFILL / BEDDING REQUIREMENTS



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
1	08/21/08	DS	CHANGED SHEET NUMBER FROM 605-28 TO 605-5 AND REVISED ENTIRE DRAWING.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

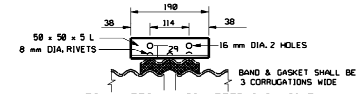
RECOMMENDED FOR APPROVAL:
CHAIRMAN STANDARDS COMMITTEE — DATE: NOV.14.2008
APPROVED:
DEPUTY DIRECTOR — DATE: NOV.14.2008

(METRIC)

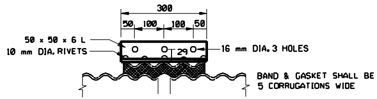
PRECAST CONCRETE PIPE CULVERT

STANDARD DRAWING TITLE

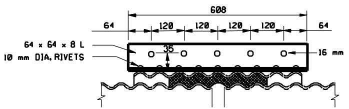
STD. DWG. NO.
605-5



450 mm-750 mm DIAMETER INCLUSIVE

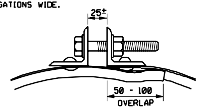


900 mm-1500 mm DIAMETER INCLUSIVE



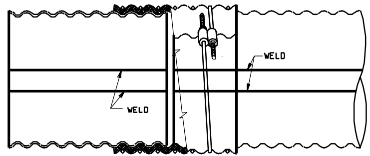
1650 mm-2100 mm DIA. INCLUSIVE

BAND SHALL BE
9 CORRUGATIONS WIDE.
GASKET SHALL BE
5 CORRUGATIONS WIDE.



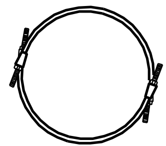
13 mm ∅ HEX. BOLT & NUT WITH WASHER OR
13 mm ∅ CARRIAGE BOLT & NUT WITH WASHER
(14 mm x 19 mm SLOTTED OPENING)

TYPE "A" C.M.P. COUPLING



BAND WIDTH

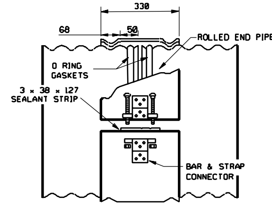
191 mm FOR 450 mm - 750 mm DIA. C.M.P. INCLUSIVE
305 mm FOR 900 mm - 1500 mm DIA. C.M.P. INCLUSIVE
610 mm FOR 1650 mm - 2100 mm DIA. C.M.P. INCLUSIVE
1 PIECE BAND FOR 450 mm - 1050 mm DIA. C.M.P.
2 PIECE BAND FOR 1200 mm - 2100 mm DIA. C.M.P.



TYPE "B" C.M.P. COUPLING

SIZE OF ROD & SILO TYPE LUG

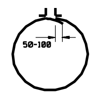
6 mm DIA. FOR 450 mm - 525 mm DIA. C.M.P.
10 mm DIA. FOR 600 mm - 900 mm DIA. C.M.P.
13 mm DIA. FOR 1050 mm - 2100 mm DIA. C.M.P.
1 PIECE HOOPS FOR 450 mm - 1050 mm DIA. C.M.P.
2 PIECE HOOPS FOR 1200 mm - 2100 mm DIA. C.M.P.



BAND THICKNESS SHOULD MATCH PIPE WALL THICKNESS, BUT IN NO CASE SHALL THEY BE LESS THAN 1.6 mm AND NEED NOT EXCEED 2.0 mm. USE TWO PIECE BAND FOR PIPE OVER 1050 mm DIAMETER.

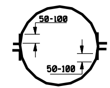
TYPE "C"

LONGITUDINAL SEAMS OF C.M.P. SHALL BE AT 45°



ONE PIECE BAND

FOR 450 mm-1050 mm DIA. PIPE CULVERTS.

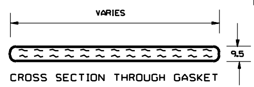


TWO PIECE BAND

FOR 1200 mm-2100 mm DIA. PIPE CULVERTS.

TABLE 1

NOMINAL PIPE DIAMETER (mm)	GASKET LENGTH (mm)
375	1118
450	1359
525	1600
600	1829
675	2032
750	2286
825	2464
900	2718
1050	3200
1200	3658
1350	4064
1500	4547
1650	5029
1800	5436
1950	5893
2100	6299
2250	6782
2400	7264



CROSS SECTION THROUGH GASKET

ALTERNATE OVERLAPS FOR TWO PIECE BANDS, FOR BOTH TYPES, AS SHOWN ON DIAGRAM.

GENERAL NOTES

1. THICKNESS OF CONNECTING BANDS SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS.
2. KEEP DIRT & GRAVEL FROM BETWEEN PIPE & BAND.
3. CHAIN HOIST, CHAIN OR CABLE CINCHING SHALL BE ADEQUATE TO PRODUCE A TIGHT JOINT BEFORE NUTS ARE TIGHTENED.
4. MINIMUM OVERLAP FOR BANDS SHALL BE AT LEAST 50 mm.
5. GASKETS DIMENSIONS SHALL COMPLY WITH TABLE 1. MATERIAL SHALL BE CLOSED CELL NEOPRENE, SKINNED ALL FOUR SIDES AND MEETING THE REQUIREMENTS OF ASTM D-1056 GRADE SCE-43L. GASKETS SHALL BE OF 1-PIECE CONTINUOUS CONSTRUCTION.
6. FOR FASTENING ANGLES USE FLATHEAD RIVETS FREE OF SHARP POINTS OR EDGES (AASHTO M36-60).

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	09/08/98		CORRECT ROUNDING ERROR IN 200-750 DIA. DETAIL
2	12/04/98	FRW	REVISED TYPE "C" NOTE.
3	08/31/00	DS	CHANGE SHEET NUMBER FROM 605-3 TO 605-6 AND REVISED ENTIRE DRAWING.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

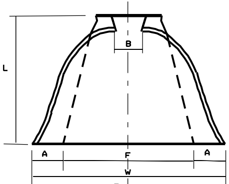
RECOMMENDED FOR APPROVAL — NOV.14,2000 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — NOV.14,2000 DATE
DEPUTY DIRECTOR

(METRIC)
GASKETED JOINTS OR COUPLING BANDS FOR C.M.P.
STANDARD DRAWING TITLE

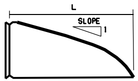
STD. DWG. NO.
605-6

END SECTIONS FOR CIRCULAR PIPE CORRUGATIONS

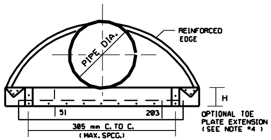
75 × 25 ; 68 × 13
125 × 25 ; 19 × 19 × 190
AND 19 × 25 × 292



PLAN



TYPICAL CROSS SECTION



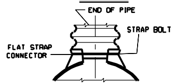
ELEVATION

LINE NO.	PIPE DIA	THICK- -NESS	END SECTION DIMENSIONS						
			A	B	H	F	L	W MAX. WIDTH	APPROXIMATE AVERAGE END SECTION SLOPE
	mm	mm	mm	mm	mm	mm	mm	mm	
1	300	1.32	127	178	152	559	533	1118	1:2.25
2	375	1.63	152	203	152	711	660	1321	1:2.25
3	450	1.63	178	254	152	864	787	1473	1:2.13
4	525	1.63	203	305	152	1016	914	1676	1:2.13
5	600	1.63	229	330	152	1168	1041	1829	1:2.13
6	750	2.01	279	406	203	1397	1295	2235	1:2.13
7	900	2.01	330	483	229	1778	1524	2667	1:2.00
8	1050	2.77	381	635	254	2083	1524	3099	1:2.13
9	1200	2.77	432	737	305	2235	1981	3327	1:2.00
10	1350	2.77	432	838	305	2540	2134	3632	1:2.00
11	1500	2.77	432	914	305	2845	2210	3988	1:1.88
12	1650	2.77	432	991	305	2997	2210	4115	1:1.63
13	1800	2.77	432	1118	305	3048	2210	4267	1:1.50
14	1950	2.77	432	1219	305	3302	2210	4521	1:1.38
15	2100	2.77	432	1321	305	3454	2210	4674	1:1.33
16	2250	2.77	432	1473	305	3607	2210	4775	1:1.25
17	2400	2.77	432	1473	305	3658	2210	5004	1:1.13

FILL SLOPE NEED NOT MATCH THE END SECTION SLOPE. FILL CAN BE SHAPED AT EACH SITE TO FIT.

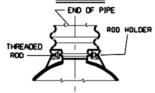
1. SOME LARGER SIZES MAY REQUIRE FIELD ASSEMBLY.
2. OPTIONAL TOE PLATES MAY BE PROVIDED TO DEPTH SPECIFIED.
3. FOR 1950 mm × 1320 mm AND 2100 mm × 1450 mm SIZES. REINFORCED EDGES TO BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES THE ANGLES TO BE ATTACHED BY GALVANIZED NUTS AND BOLTS FOR STEEL UNITS OR ALUMINUM NUTS AND BOLTS FOR ALUMINUM UNITS.

TYPE 1



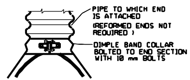
AVAILABLE IN SIZES 300 mm THROUGH 600 mm ROUND AND 430 mm × 330 mm THROUGH 710 mm × 550 mm PIPE-ARCHES

TYPE 2



AVAILABLE IN SIZES 750 mm THROUGH 2400 mm ROUND AND 885 mm × 610 mm THROUGH 1440 mm × 970 mm PIPE-ARCHES

TYPE 3



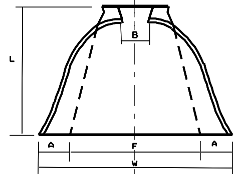
AVAILABLE FOR ALL ROUND AND PIPE ARCH SIZES SHOWN (TYPE 1 AND TYPE 2 CONDITIONS ARE RECOMMENDED FOR THE SMALLER SIZES WITH ANNULAR ENDS)

APPLICABLE SPECIFICATIONS (CIRCULAR AND ARCH PIPE)

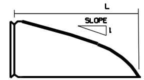
1. THE MATERIAL USED IN THE FABRICATION OF END SECTIONS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF:
   AASHTO M 218M's (GALVANIZED STEEL SHEETS)
   AASHTO M 197M's (ALUMINUM ALLOY SHEETS)
2. ALL 3 PIECE BODIES TO HAVE 2.77 mm MIN. SIDES AND 3.51 mm MIN. CENTER PANELS. MULTIPLE PANEL BODIES TO HAVE SEAMS WHICH ARE TO BE TIGHTLY JOINED BY GALVANIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM RIVETS OR BOLTS FOR ALUMINUM UNITS.
4. GALVANIZED STEEL OR ALUMINUM TOE PLATE TO BE AVAILABLE AS AN ACCESSORY, WHEN SPECIFIED, AND WILL BE THE SAME THICKNESS AS THE END SECTION.
5. GALVANIZED STEEL OR ALUMINUM LIFTING LUG AVAILABLE AS AN ACCESSORY, WHEN SPECIFIED.
6. END SECTIONS CAN BE USED WITH ANY OR PIPE OR PIPE ARCH WALL THICKNESS SPECIFIED.

END SECTIONS FOR CORRUGATED METAL PIPE ARCHES

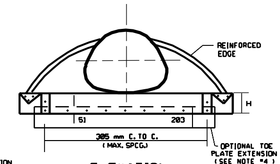
75 × 25 ; 125 × 25
AND 68 × 13



PLAN



TYPICAL CROSS SECTION



ELEVATION

LINE NO.	SPAN × RISE	EQUIV. ROUND	THICKNESS		END SECTION DIMENSIONS						
			GALV. STEEL	ALUM.	A MIN.	B MAX.	H MIN.	F MIN.	L±50	W MAX. WIDTH	APPROXIMATE AVERAGE END SECTION SLOPE
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
1	430×330	375	1.63	1.52	127	229	152	711	508	1321	1:2.125
2	530×380	450	1.63	1.52	152	279	152	864	610	1473	1:2
3	610×460	525	1.63	1.52	178	305	152	1016	711	1600	1:2.125
4	710×510	600	1.63	1.52	178	406	152	1168	813	1778	1:2
5	885×610	750	2.01	1.91	229	406	152	1473	991	2159	1:1.875
6	1060×740	900	2.01	1.91	279	457	178	1854	1168	2642	1:1.875
7	1240×840	1050	2.77	2.67	305	533	229	2083	1346	2972	1:1.75
8	1440×970	1200	2.77	2.67	406	660	305	2235	1575	3353	1:1.875
9	1620×1100	1350	2.77	2.67	432	762	305	2540	1753	3658	1:1.875
10	1800×1200	1500	2.77	2.67	432	914	305	2845	1956	3962	1:1.875
11	1950×1320	1650	2.77	2.67	432	914	305	3150	1956	4242	1:1.625
12	2100×1450	1800	2.77	2.67	432	1118	305	3302	1956	4496	1:1.5

FILL SLOPE NEED NOT MATCH THE END SECTION SLOPE. FILL CAN BE SHAPED AT EACH SITE TO FIT.

1. SOME LARGER SIZES MAY REQUIRE FIELD ASSEMBLY.
2. OPTIONAL TOE PLATES MAY BE PROVIDED TO DEPTH SPECIFIED.
3. FOR 1950 mm × 1320 mm AND 2100 mm × 1450 mm SIZES. REINFORCED EDGES TO BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES THE ANGLES TO BE ATTACHED BY GALVANIZED NUTS AND BOLTS FOR STEEL UNITS OR ALUMINUM NUTS AND BOLTS FOR ALUMINUM UNITS.
4. ANGLE REINFORCEMENT WILL BE PLACED UNDER THE CENTER PANEL SEAMS ON THE 1950 mm × 1320 mm AND 2100 mm × 1450 mm SIZES.

ALL DIMENSIONS ARE SHOWN IN MILLIMITERS (mm) UNLESS OTHERWISE NOTED

NO.	DATE	[redacted]	REVISIONS / REMARKS
1	12/14/98	FRW	CORRECTED SHEET NUMBER.
2	08/31/00	DS	CHANGED SHEET NUMBER FROM 605-2 TO 605-7 AND REVISED ENTIRE DRAWING.

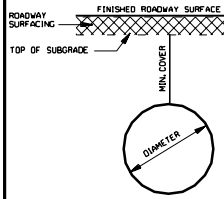
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — NOV.14,2000 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — NOV.14,2000 DATE
DEPUTY DIRECTOR

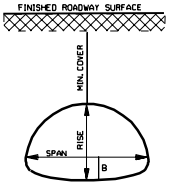
(METRIC)
METAL CULVERT END SECTION
STANDARD DRAWING TITLE

STD. DWG. NO.
605-7

METAL & PLASTIC CULVERTS



METAL PIPE ARCHES



MINIMUM COVER

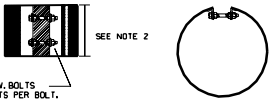
A. MEASURE MINIMUM COVER FROM THE TOP OF THE PIPE CULVERT TO THE BOTTOM OF ROADWAY SURFACING.

B. MEASURE MAXIMUM FILL HEIGHT FROM THE TOP OF THE PIPE TO THE TOP OF THE PAVEMENT FOR BOTH FLEXIBLE AND RIGID PAVEMENTS.

C. MINIMUM COVER OVER THE CROWN OF THE PIPE IS ADEQUATE ONLY FOR FINISHED CONSTRUCTION. DURING CONSTRUCTION THE CONTRACTOR WILL PROVIDE ADEQUATE MINIMUM COVER TO PROTECT PIPE AND PIPE ARCH FROM DAMAGE.

METAL INSERT

FOR CONNECTING CONCRETE PIPE OR CORRUGATED POLYETHYLENE PIPE TO METAL END SECTION.

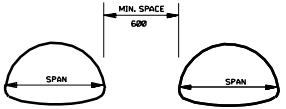


METAL INSERTS

1. FABRICATED END SECTION FROM NON FLAMABLE MATERIALS.
2. CONNECT METAL END SECTIONS TO CONCRETE PIPES OR PLASTIC PIPES USING METAL INSERTS.
3. FOR PIPE DIAMETERS UP TO AND INCLUDING 1500 mm THE LENGTH OF INSERT SHALL BE AT LEAST 300 mm USING A MINIMUM OF 2 BOLTS.
4. FOR PIPE DIAMETERS GREATER THAN 1500 mm THE LENGTH OF INSERT SHALL BE AT LEAST 450 mm USING A MINIMUM OF 3 BOLTS.
5. GALVANIZED METAL INSERT AND ALL BOLTS, WASHERS AND RIVETS OR WELDS.
6. WALL THICKNESS OF THE METAL INSERT SHALL BE THE SAME AS THE METAL END SECTION.
7. ALL WELDS SHALL BE CLEANED AND COATED WITH APPROVED ZINC RICH COMPOUND AS RECOMMENDED BY THE SHEET MANUFACTURER.

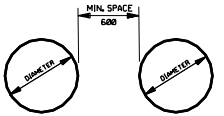
MULTIPLE INSTALLATIONS

PIPE ARCHES



SPAN	MINIMUM SPACE
UP TO 900	600
1800 TO 2150	1/3 SPAN

PIPE CULVERTS



DIAMETER	MINIMUM SPACE
UP TO 600	600
1200 TO 2500	½ DIAMETER
2500 TO 3050	1200

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
1	12/14/98	FRM	CORRECTED SHEET NUMBER
2	08/12/08	DS	CHANGED SHEET NUMBER FROM 625-4 TO 625-8 AND REVISED ENTIRE DRAWING.
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — NOV 14 2008 DATE

CHAIRMAN, STANDARDS COMMITTEE — NOV 14 2008 DATE

APPROVED

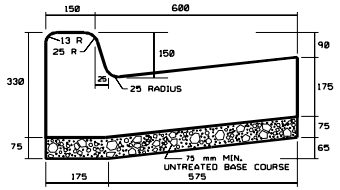
DEPUTY DIRECTOR

(METRIC)

MISCELLANEOUS PIPE DETAILS

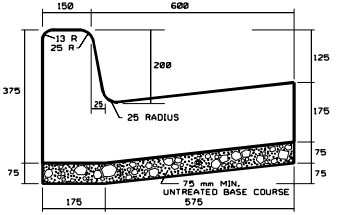
STANDARD DRAWING TITLE

STD. DWG. NO.
605-8



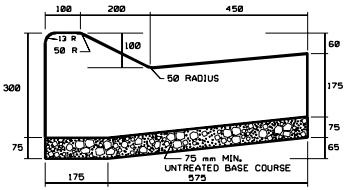
TYPE B1

CURB & GUTTER
AREA = 0.156 SQ. METERS



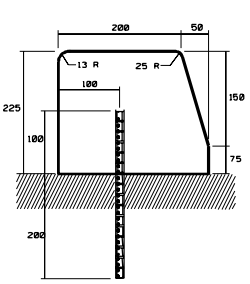
TYPE B2

CURB & GUTTER
AREA = 0.164 SQ. METERS



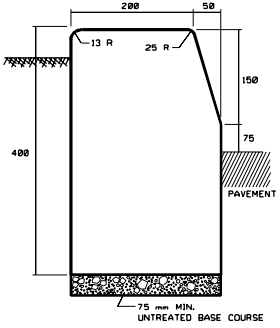
TYPE M1

CURB & GUTTER
AREA = 0.158 SQ. METERS



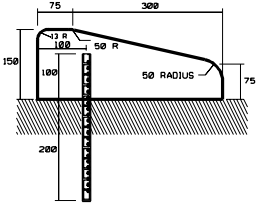
TYPE B3

CURB
AREA = 0.046 SQ. METERS



TYPE B4

CURB
AREA = 0.096 SQ. METERS



TYPE M2

CURB
AREA = 0.045 SQ. METERS

NOTES:

1. TYPES B1, B2, & M1 ARE DRAINAGE CURBS.
2. TYPES M1 & M2 ARE MOUNTABLE CURBS. FOR APPLICATION REFER TO THE AASHTO POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS.
3. TYPES B1, B2, B3 & B4 ARE BARRIER CURBS. BARRIER CURB MAY BE USED WITH DESIGN SPEEDS UP TO 70 km/h EXCEPT IN PREDOMINATELY URBAN OR RAPIDLY DEVELOPING RURAL AREAS WHERE BARRIER CURB MAY BE USED WITH DESIGN SPEEDS UP TO 80 km/h.
4. DOWELS SHALL BE 20M DEFORMED BARS ON 1.5 m MAX. CENTERS.
5. PRECAST CURBS
   A. PRECAST CURBS SHALL BE A MINIMUM OF 3 m IN LENGTH.
   B. DOWELS SHALL BE PLACED AT A MINIMUM OF 3 PER 3 m LENGTH.
   C. PRECAST SECTIONS SHALL INCLUDE ADEQUATE REINFORCING STEEL TO WITHSTAND HANDLING STRESSES.
6. CONCRETE CLASS AA 'AE'
7. USE TYPE B4 ONLY AS A BORDER CURB.
8. CURB HEIGHT IS MEASURED VERTICALLY FROM THE FLOW LINE OF THE GUTTER TO TOP BACK OF CURB.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	REVISIONS	DATE	REMARKS
1	UPDATED FROM BITEAM	12/29/97	
2	DELETE NOTE #9 AND ADDED 13 mm RADIUS TO ALL DRAWINGS.	8/27/98	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: DEC-08-1998 DATE

CONCURRED STANDARDS COMMITTEE CHAIRMAN: DEC-08-1998 DATE

DEPUTY DIRECTOR

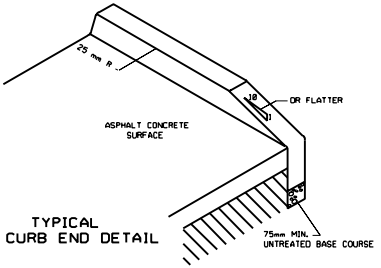
(METRIC)

CONCRETE CURB & GUTTER

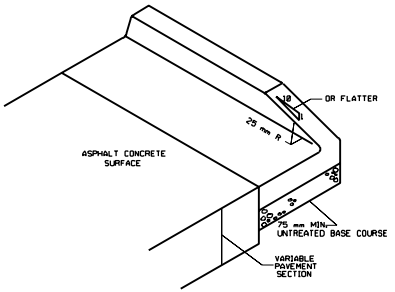
STANDARD DRAWING TITLE

STD. DWG. NO.

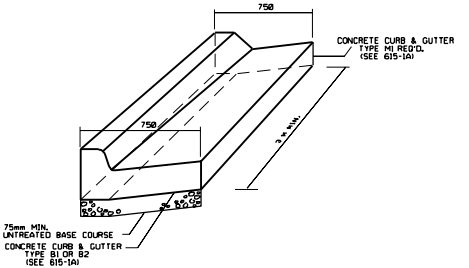
615-1A



TYPICAL
CURB END DETAIL



TYPICAL
CURB & GUTTER END DETAIL



CURB & GUTTER TRANSITION DETAIL

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	BY	REMARKS
1	06-30-99	JEE	REVISED CURB & GUTTER AND APPROACH SLOPE CONCRETE THICKNESS (SEE DETAIL)
2	02/01/08	BA	CORRECT CURB & GUTTER TRANSITION DETAIL TO SHOW PROPER TYPE OF TRANSITION

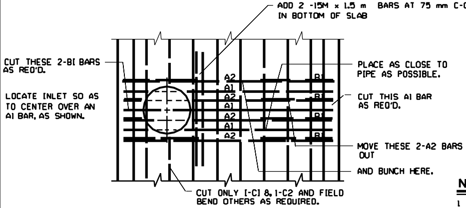
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
DEPUTY DIRECTOR — FEB 05 2008 DATE

CHAIRMAN, STANDARDS COMMITTEE
APPROVED
FEB 05 2008 DATE

(METRIC)
CONCRETE
CURB & GUTTER
DETAILS
STANDARD DRAWING TITLE

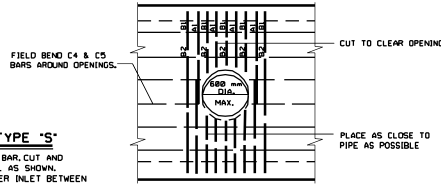
STD. DWG. NO.
615-1B



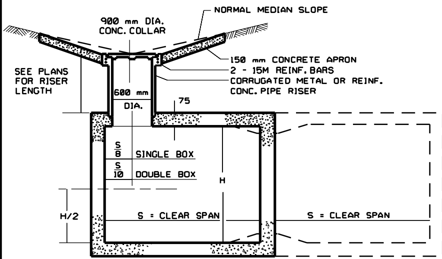
PLAN

NOTES FOR SIDE INLET TYPE "S"

1 - FOR BOXES, CENTER INLET ON A 'B1' BAR, CUT AND FIELD BEND THE REINFORCING STEEL AS SHOWN.
2 - FOR FLUMES OR PASSAGEWAYS, CENTER INLET BETWEEN 'R' BARS AND FIELD BEND OR SHIFT 'R' AND 'O' BARS TO CLEAR OPENING.
3 - SEE ROADWAY PLANS FOR SIZE AND LENGTH OF PIPE REQUIRED PIPE AND END SECTION SHALL BE INCLUDED IN ROADWAY QUANTITIES.
4 - WARP MEDIAN, LOCATE END SECTION AND PROVIDE DIKES AS REQUIRED, IN ACCORDANCE WITH DWG. 620-2.

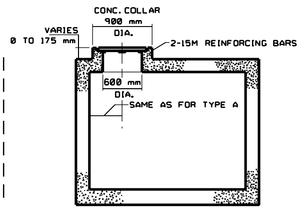


ELEVATION



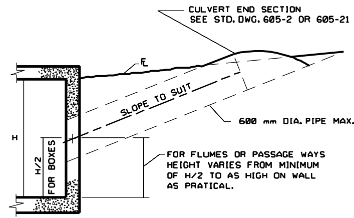
TOP INLET TYPE "A"

(SECTION)



TOP INLET TYPE "B"

(SECTION)



SIDE INLET TYPE "S"

(SECTION ALONG ℄ MEDIAN DITCH)

NOTE:

IF RADIUS OF PIPE IS GREATER THAN S/8 OR S/10 PLACE OPENINGS FLUSH WITH INSIDE FACE OF WALL.

NOTES FOR TOP INLET

5 - FOR TYPE "B" INSTALLATION, REINFORCING BARS IN THE TOP SLAB SHALL BE CUT AND FIELD BENT THE SAME AS SHOWN FOR TYPE "A".
6 - INLET GRATE, CONCRETE COLLAR AND PIPE RISER SHALL BE IN ACCORDANCE WITH STD. DWG. 620-1 EXCEPT AS NOTED IN TYPE "B", AND SHALL BE PAID FOR IN ACCORDANCE WITH THE STD. SPEC. FOR "MEDIAN DROP INLET."
7 - FOR SPANS 1.8 m AND LESS WHERE REINFORCING STEEL IS IN THE BOTTOM OF THE TOP SLAB ONLY, CUT THE ONE TRANSVERSE BAR ON ℄ OF THE PIPE TO CLEAR THE OPENING AND MOVE THE REMAINDER OF THE BARS FALLING WITHIN THE OPENING TO EACH SIDE OF THE PIPE.
8 - TYPE II CEMENT (LOW ALKALI) AND CLASS A CONCRETE (AE) REQUIRED.
9 - CONCRETE AND REINFORCING STEEL SHALL BE IN ACCORDANCE WITH CURRENT STD. SPECS. FOR ROAD AND BRIDGE CONSTR.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHRWISE NOTED.

NO.	DATE	REMARKS
1	10/27/98	DELETE NOTE "6

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC.08,1998 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — DEC.08,1998 DATE

DEPUTY DIRECTOR

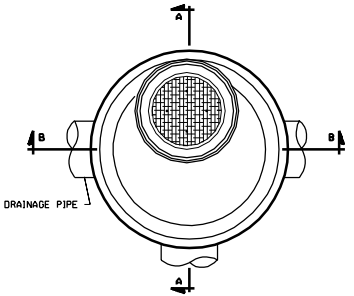
(METRIC)

MEDIAN DRAIN INTO BOX CULVERT

STANDARD DRAWING TITLE

STD. DWG. NO.

620-3



PLAN

ms = HEIGHT OF ONE MANHOLE SECTION
D = DIAMETER OF MANHOLE SECTION
h = TOTAL HEIGHT OF PERCAST GRADE RINGS (300mm MAXIMUM)

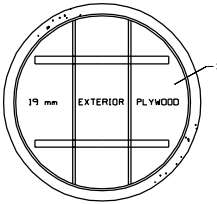
1- PRECAST GRADE RINGS ARE FURNISHED IN HEIGHTS OF 100mm, 150mm, OR 200mm.

2- MANHOLE SECTIONS ARE FURNISHED IN HEIGHTS OF 300mm, 450mm, 600mm, 900mm OR 1200mm. IN DIAMETER OF 1.2m AND 1.5m WITH WALL THICKNESS OF 125mm OR 150mm.

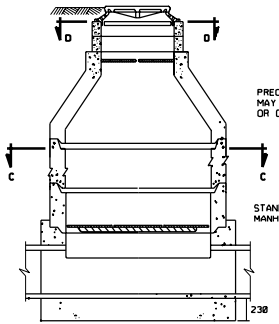
3- IF THE REQUIRED RAISE IS MORE THAN 300mm THE CONE SHALL BE REMOVED AND RINGS ADDED TO THE MANHOLE SECTION. BACKFILL SHALL BE COMPACTED TO A MIN. OF 98% DENSITY AND THE ROADWAY SURFACING REPLACED IN KIND.

4- THE CONTRACTOR SHALL INSTALL A PLYWOOD COVER, AS DETAILED, IN EITHER THE UPPER OR LOWER SECTION OF THE MANHOLE BEFORE ANY WORK IS STARTED ON MODIFYING THE MANHOLE. THE COVER SHALL REMAIN IN PLACE UNTIL THE MANHOLE RING AND COVER ARE BACK IN PLACE AND SHALL POSITIVELY PREVENT CONSTRUCTION DEBRIS FROM FALLING TO THE MANHOLE FLOOR OR ENTERING THE DRAINAGE SYSTEM.

5- ANY DAMAGE TO THE MANHOLE RESULTING FROM THE CONTRACTORS OPERATIONS SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE DEPARTMENT.

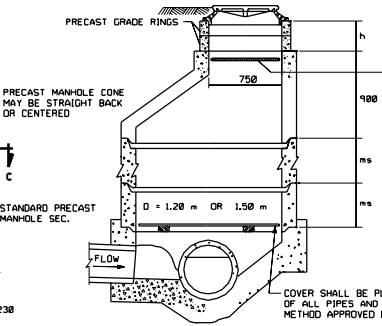


SECTION C-C



STANDARD PRECAST MANHOLE SEC.

SECTION B-B

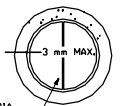


PRECAST MANHOLE CONE MAY BE STRAIGHT BACK OR CENTERED

COVER SHALL BE HELD IN PLACE BY ANY METHOD APPROVED BY THE ENGINEER.

COVER SHALL BE PLACED ABOVE CROWN OF ALL PIPES AND HELD IN PLACE BY ANY METHOD APPROVED BY THE ENGINEER

SECTION A-A



2 OR MORE SECTIONS 19 mm x 1760 mm DIA. EXTERIOR PLYWOOD

SECTION D-D

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: DATE

CHAIRMAN STANDARDS COMMITTEE

APPROVED: DATE

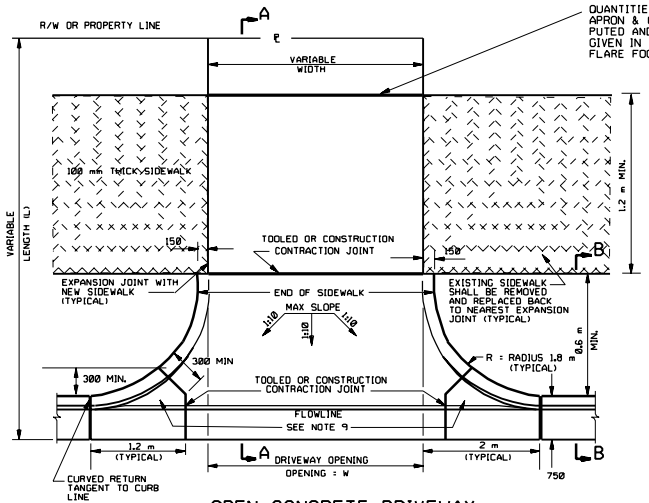
DEPUTY DIRECTOR

(METRIC)

PRECAST MANHOLE MODIFICATION DETAILS

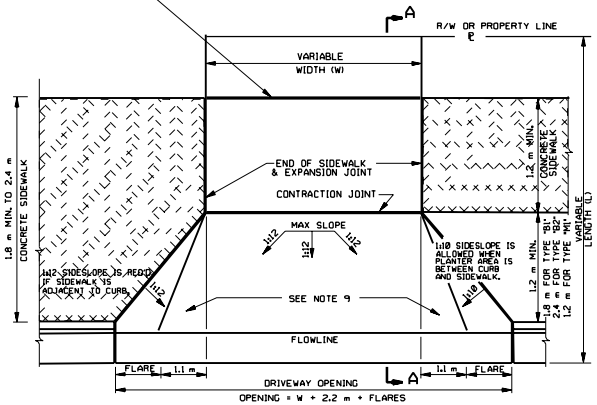
STANDARD DRAWING TITLE

STD. DWG. NO.
650-5

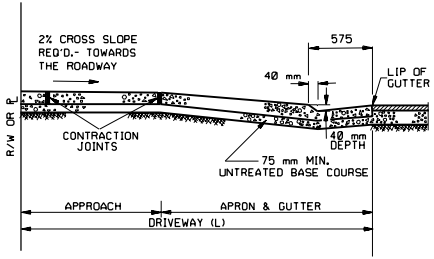


OPEN CONCRETE DRIVEWAY

QUANTITIES FOR THE DRIVEWAY APPROACH, APRON & GUTTER m^2 SHALL BE COMPUTED AND ADDED TO THE QUANTITIES GIVEN IN THE DRIVEWAY RADIUS AND FLARE FOOTAGE CHART.



FLARED DRIVEWAY



SECTION A-A

DRIVEWAY RADIUS AND FLARE AREA CHART			
OPEN CONCRETE DRIVEWAY	m^2	FLARED DRIVEWAY	m^2
1.8 m RADIUS	4.10	12:1 FLARES	
		1- TYPE "B1" CURB & GUTTER	8.18
		2- TYPE "B2" CURB & GUTTER	12.07
		3- TYPE "M1" CURB & GUTTER	4.14
NOTE:			
m^2 QUANTITY = BOTH SIDES OF			
DRIVEWAY ROUNDED TO THE		10:1 FLARES	
NEAREST 0.05 m^2		1- TYPE "B1" CURB & GUTTER	7.33
		2- TYPE "B2" CURB & GUTTER	10.72
		3- TYPE "M1" CURB & GUTTER	3.22

NOTES

1- DRIVEWAY DIMENSIONS (MAX.& MIN.) ARE LOCATED IN U.D.O.T. "MANUAL FOR THE ACCOMMODATION OF UTILITIES AND THE CONTROL AND PROTECTION OF STATE HIGHWAY RIGHTS OF WAY" CURRENT EDITION.

2- MAXIMUM DISTANCE BETWEEN TOOLED OR CONSTRUCTION JOINTS SHALL BE 3 m LATERALLY AND LONGITUDINALLY SPACED EQUALLY.

3- PROVIDE EXPANSION JOINTS WHERE CONCRETE SIDEWALK BUTTS AGAINST CONCRETE DRIVEWAYS AND IN THE CONCRETE SIDEWALK AT 9 m INTERVALS.

4- SIDEWALK SHALL NOT BE PAID FOR INSIDE DRIVEWAY LIMITS (WIDTH & LENGTH).

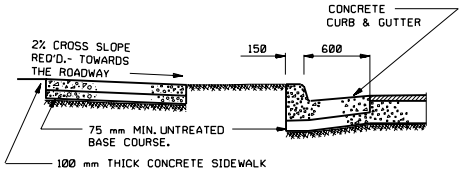
5- OPEN CONCRETE DRIVEWAY - FLARED DRIVEWAY
A: RESIDENTIAL = 150 mm THICK. COMMERCIAL = 175 mm THICK.
B: EXTEND DRIVEWAY APPROACH TO R/W - PROPERTY LINE.
C: IF THE GRADES SHOWN ON THE SLOPE DETAIL CANNOT BE MET, THE LONGITUDINAL SLOPE OF THE SIDEWALK MAY BE DEPRESSED AT A RATE OF 5% TO MEET THE APRON - APPROACH ELEVATION.

6- USE CLASS AA(AE) CONCRETE FOR SIDEWALK & DRIVEWAYS.

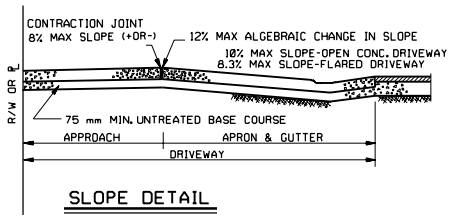
7- USE UNTREATED BASE COURSE UNDER ALL SIDEWALKS AND DRIVEWAYS.

8- 1:10 = 10% SLOPE ; 1:12 = 8.33% SLOPE.

9- QUANTITIES FOR DRIVEWAYS INCLUDE RADIUS AND FLARES TO LIP OF GUTTER .



SECTION B-B



SLOPE DETAIL

EXPANSION-CONTRACTION JOINT DETAIL

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS					
NO.	DATE	APPR.	REMARKS		
1	10/27/98		CORRECT PAGE NUMBER AND CHANGED SLOPE		
2	7/14/99	LW	CALLOUTS ON DRAWINGS AND NOTES.		
3	06/29/00	FRW	UPDATE MANUAL TITLE IN NOTE 1		
4	03/20/01	FRW	REVISED TABLE QUANTITIES - ADDED NOTE 9.		
			ADDED SIDEWALK CROSS SLOPE NOTE TO SECTION A-A		

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10, 2001 DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED — APR.10, 2001 DATE
DEPUTY DIRECTOR

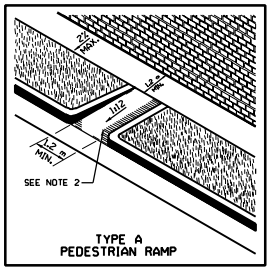
(METRIC)

CONCRETE DRIVEWAYS & SIDEWALKS

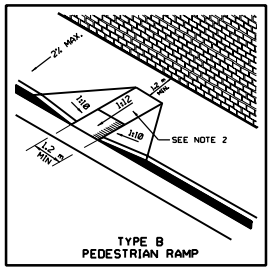
STANDARD DRAWING TITLE

STD. DWG. NO.

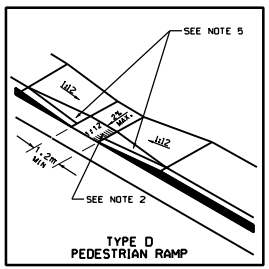
715-1



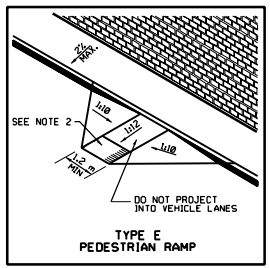
TYPE A
PEDESTRIAN RAMP



TYPE B
PEDESTRIAN RAMP



TYPE D
PEDESTRIAN RAMP



TYPE E
PEDESTRIAN RAMP

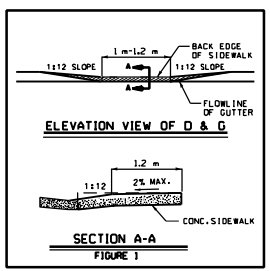


FIGURE 1

TYPE A - PEDESTRIAN RAMP
THE ENTIRE RAMP SLOPE IS ACHIEVED OUTSIDE THE SIDEWALK SECTION. A STEEP FACED CURB IS USED ALONG THE RAMP. THIS TYPE OF RAMP IS ALWAYS PREFERRED BECAUSE IT PROVIDES A CONSISTENT SIDEWALK SECTION FREE OF RAMP CROSS-SLOPES.

TYPE B - PEDESTRIAN RAMP
THE STEEPEST ALLOWABLE SLOPE OCCURS ALONG THE SIDEWALK AT 1:10. PROVIDE AT LEAST 1.2 m OF SIDEWALK WIDTH BEYOND THE RAMP.

TYPE D - PEDESTRIAN RAMP
USE THIS TYPE OF RAMP WHEN THERE IS INSUFFICIENT WIDTH TO ACCOMMODATE TYPE B PEDESTRIAN RAMP. THE STEEPEST ALLOWABLE SLOPE OCCURS ALONG THE SIDEWALK AT 1:12. PROVIDE AT LEAST 1.2 m x 1.2 m SIDEWALK AT THE BASE OF THE RAMP.

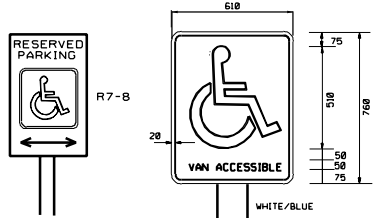
TYPE E - PEDESTRIAN RAMP
DO NOT PROJECT THE BUILT-UP RAMP SECTION INTO TRAFFIC LANE.

TYPE G - PEDESTRIAN RAMP
USE THIS TYPE OF RAMP AT INTERSECTIONS WHEN CROSSWALK FACILITIES ARE PROVIDED.

TYPE H - PEDESTRIAN MEDIAN BREAK
USE THIS TYPE OF MEDIAN ACCESS WHEN CROSSWALK FACILITIES ARE PROVIDED.

FIGURE 1
ILLUSTRATES THE CROSS SECTION AND PROFILE VIEW OF TYPE B AND TYPE D PEDESTRIAN RAMPS. CONSTRUCT THE RAMP BASE SURFACE EVEN WITH THE PAVEMENT SURFACE AT THE FACE OF THE CURB.

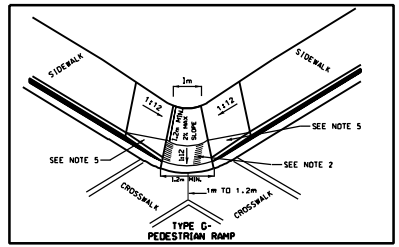
NOTES:
1. PEDESTRIAN RAMPS TYPE A, B, D, & E ARE ACCEPTABLE FOR USE AT MID-BLOCK CROSSWALKS.
2. PROVIDE DETECTABLE WARNING AREA AT THE BASE OF THE CURB RAMP (0.6 m LONG MINIMUM). INSTALL DETECTABLE WARNINGS BY IMPRESSING AND REMOVING EXPANDED METAL MESH INTO THE BASE OF THE RAMP SURFACE WHILE THE CONCRETE IS STILL IN A PLASTIC STATE. SEE FIGURE 3 FOR DIMENSION DETAILS.
3. PROVIDE ONE DESIGNATED "VAN ACCESSIBLE" PARKING SPACE IN EVERY EIGHT ACCESSIBLE PARKING SPACES, BUT NOT LESS THAN ONE.
4. REFER TO THE MUTCD (LATEST EDITION) FOR RESERVED PARKING SIGNING FOR DISABLED PERSONS (R7-8).
5. WARP SIDEWALK TO MATCH.



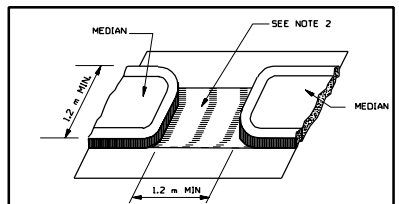
RESERVED ACCESSIBLE
PARKING SIGNING
SEE NOTE 4

SIGNING FOR "VAN ACCESSIBLE"
PARKING SPACES
SEE NOTE 3

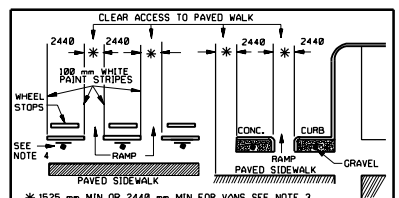
ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.



TYPE G-
PEDESTRIAN RAMP

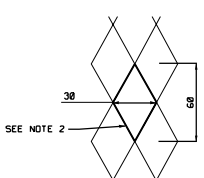


TYPE H
PEDESTRIAN RAMP



STRIPING DETAILS
RESERVED PARKING FOR THE HANDICAPPED

FIGURE 2



DETECTABLE WARNING

FIGURE 3

REVISIONS

1.	11/23/98	J.B.	DELETE NOTE 3 REVISED TYPE "G" FIGURE 1 AND CHANGED SHEET NUMBER.
2	01/27/99	FRM	REVISED TYPE "G" AND ADDED SIGNS AND SIGNING IN FIGURE 2 AND NOTE 5
3.	12/28/01	M.C.	DELETE RAMP TYPE C, REVISED RAMP TYPE G TO MEET ADA AND REVISED ALL NOTES.
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JAN.08.2002 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — JAN.08.2002 DATE

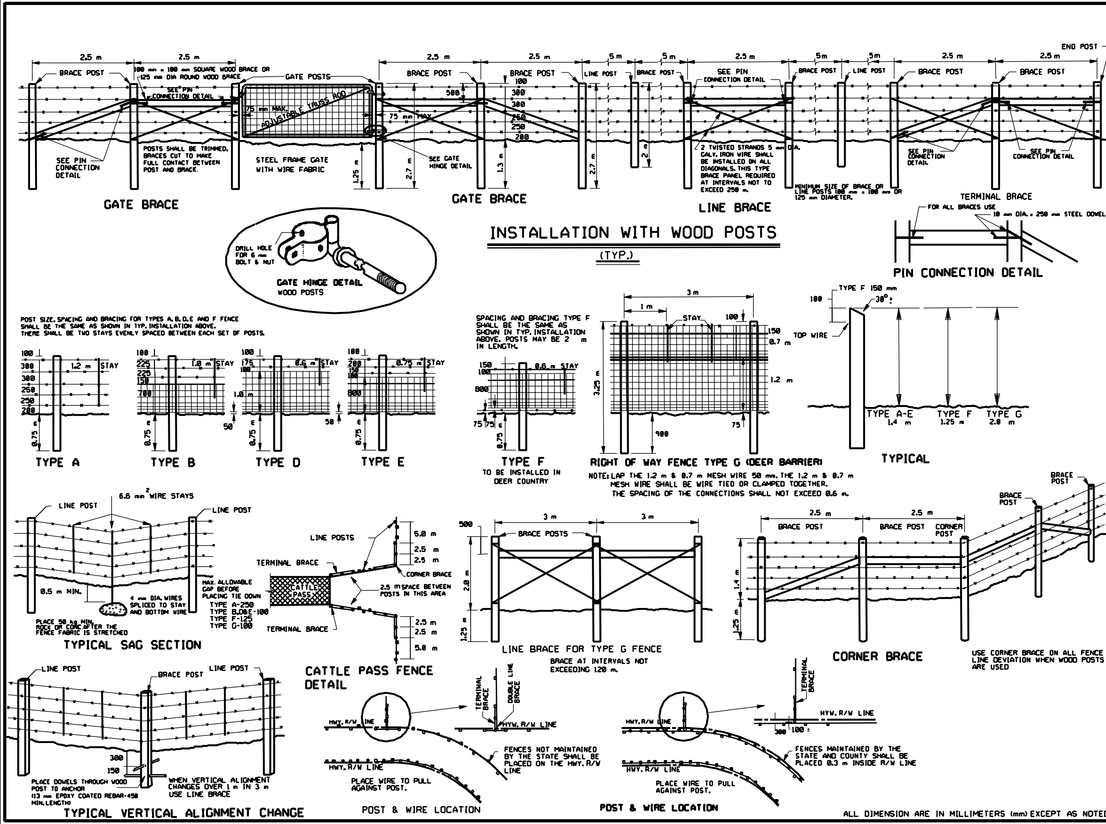
DEPUTY DIRECTOR

(METRIC)

DISABLED PEDESTRIAN ACCESS

STANDARD DRAWING TITLE

STD. DWG. NO.
715-2



REVISIONS

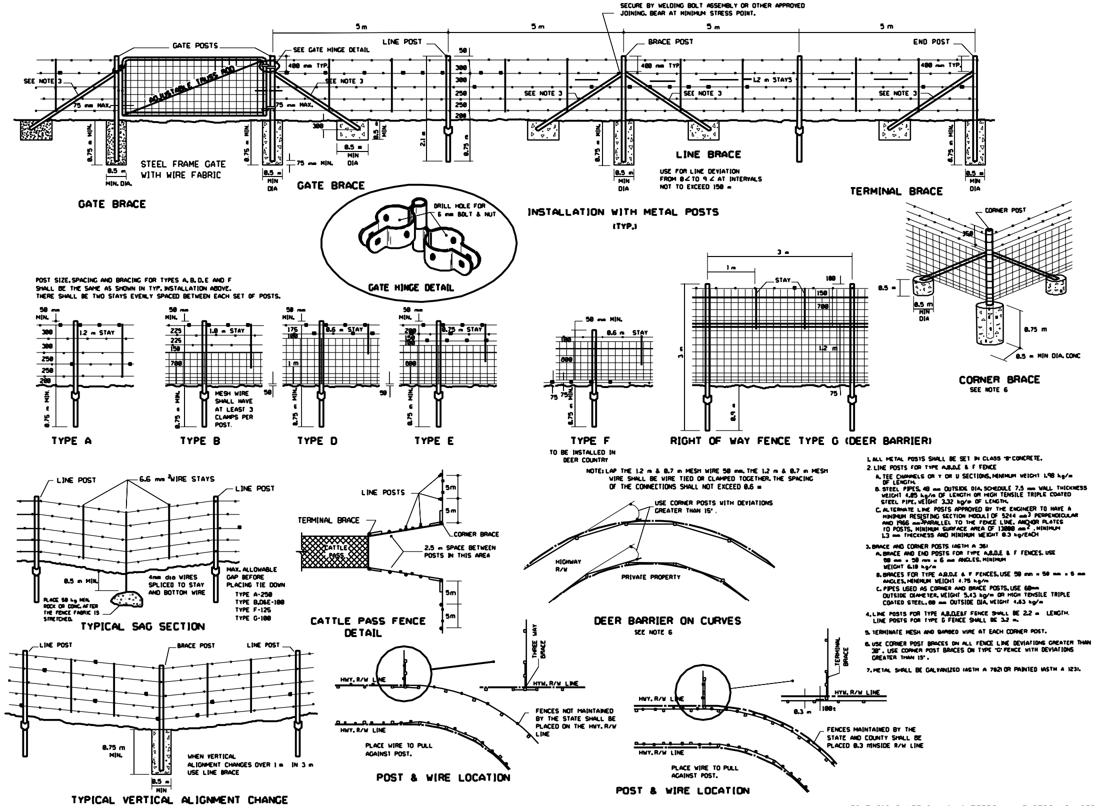
NO.	DATE	APPR.	REMARKS
1	04/08/98		CORRECT ROUNDING ERROR IN GATE BRACE DETAIL. BRACE POST.
2	04/27/99	B.A.	CORRECT DIMENSION NOTE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.27,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — APR.27,1999 DATE

(METRIC)
RIGHT OF WAY FENCE AND GATES (WOOD POST)
STANDARD DRAWING TITLE

STD. DWG. NO.
720-1A



1. ALL METAL POSTS SHALL BE SET IN CLASS "B" CONCRETE.
2. LINE POSTS FOR TYPE A,B,D,E & F FENCE
   A. TEE CHANNELS OR Y OR U SECTIONS, MINIMUM WEIGHT 1.98 kg/m OF LENGTH.
   B. STEEL PIPES, 48 mm OUTSIDE DIA, SCHEDULE 7.5 mm WALL THICKNESS WEIGHT 4.05 kg/m OF LENGTH OR HIGH TENSILE TRIPLE COATED STEEL PIPE, WEIGHT 3.32 kg/m OF LENGTH.
   C. ALTERNATE LINE POSTS APPROVED BY THE ENGINEER TO HAVE A MINIMUM RESISTING SECTION MODULI OF 5244 mm^3 PERPENDICULAR AND 1966 mm^3 PARALLEL TO THE FENCE LINE. ANCHOR PLATES TO POSTS, MINIMUM SURFACE AREA OF 13000 mm^2, MINIMUM 1.3 mm THICKNESS AND MINIMUM WEIGHT 0.3 kg/EACH
3. BRACE AND CORNER POSTS (ASTM A 36)
   A. BRACE AND END POSTS FOR TYPE A,B,D,E & F FENCES. USE 50 mm x 50 mm x 6 mm ANGLES. MINIMUM WEIGHT 6.10 kg/m
   B. BRACES FOR TYPE A,B,D,E & F FENCES, USE 50 mm x 50 mm x 6 mm ANGLES, MINIMUM WEIGHT 4.75 kg/m
   C. PIPES USED AS CORNER AND BRACE POSTS, USE 60mm OUTSIDE DIAMETER, WEIGHT 5.43 kg/m OR HIGH TENSILE TRIPLE COATED STEEL, 60 mm OUTSIDE DIA, WEIGHT 4.63 kg/m
4. LINE POSTS FOR TYPE A,B,D,E&F FENCE SHALL BE 2.2 m LENGTH. LINE POSTS FOR TYPE G FENCE SHALL BE 3.2 m.
5. TERMINATE MESH AND BARBED WIRE AT EACH CORNER POST.
6. USE CORNER POST BRACES ON ALL FENCE LINE DEVIATIONS GREATER THAN 30°. USE CORNER POST BRACES ON TYPE "G" FENCE WITH DEVIATIONS GREATER THAN 15°.
7. METAL SHALL BE GALVANIZED (ASTM A 782) OR PAINTED (ASTM A 123).

ALL DIMENSIONS ARE IN MILLIMETERS (mm) EXCEPT AS NOTED.

REVISIONS

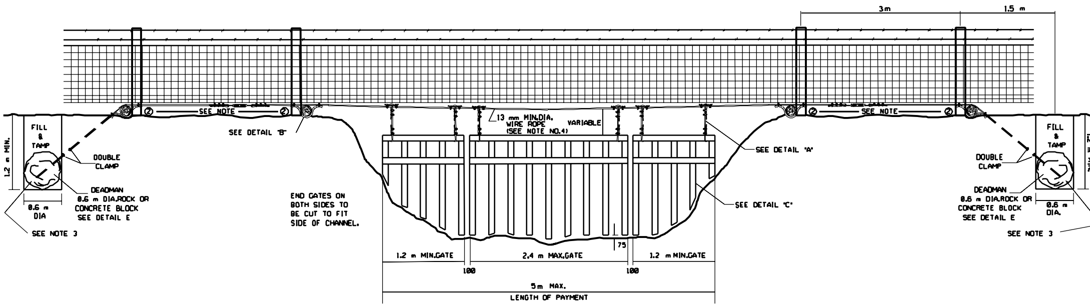
No.	DATE	APPR.	REMARKS
1	09/08/98		CORRECT ROUNDING ERROR IN GATE BRACE DETAIL. LINE POST.
2	04/27/99	B.A.	CORRECT DIMENSION NOTE
3	09/29/99	B.A.	CORRECT ERROR IN DEER BARRIER ON CURVES DETAIL AND NOTE 6

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — DEC 14,1999 DATE
APPROVED
DEPUTY DIRECTOR — DEC 14,1999 DATE

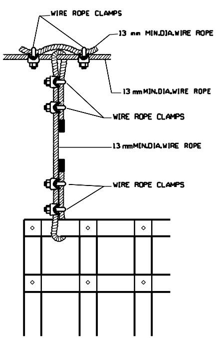
(METRIC)
RIGHT OF WAY FENCE AND GATES (METAL POST)
STANDARD DRAWING TITLE

STD. DWG. NO.
720-1B

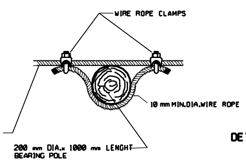


INSTALLATION DETAIL

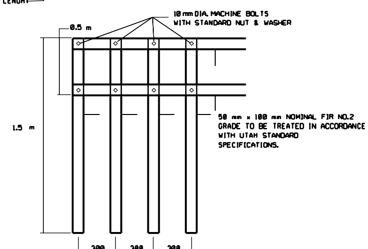
DETAIL A



DETAIL B



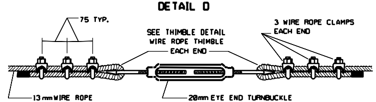
DETAIL C



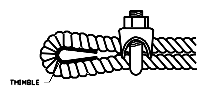
NOTES:

1. INSTALLATION OF BEARING POLES, DEADMAN AND TURN BUCKLE SHALL BE THE SAME ON BOTH SIDES OF THE CHANNEL.
2. WIRE ROPE SHALL BE INSTALLED ON THE UPSTREAM SIDE OF THE FENCE POSTS.
3. WRAP WIRE ROPE AROUND ROCK AND CLAMP WITH A DOUBLE CLAMP.
4. USE 13 mm DIA.WIRE 6x12 WITH A BREAKING STRENGTH OF 45kN

DETAIL D



THIMBLE DETAIL



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/27/99	B.A.	CORRECT DIMENSION NOTE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.27,1999 DATE

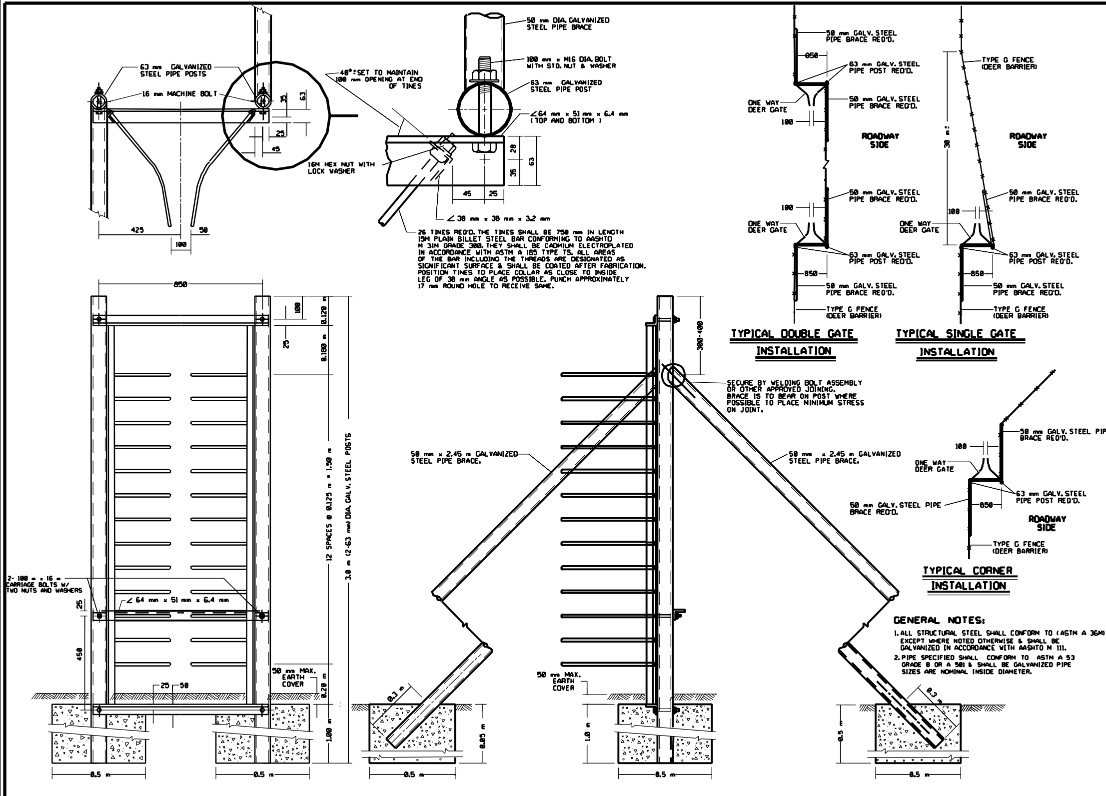
CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.27,1999 DATE

DEPUTY DIRECTOR

(METRIC)
SWING GATES
TYPE 1
FOR GATES LESS THAN 5 m

STANDARD DRAWING TITLE

STD. DWG. NO.
720-1C



GENERAL NOTES:

1. ALL STRUCTURAL STEEL SHALL CONFORM TO (ASTM A 36M) EXCEPT WHERE NOTED OTHERWISE & SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M 111.
2. PIPE SPECIFIED SHALL CONFORM TO ASTM A 53 GRADE B OR A 501 & SHALL BE GALVANIZED PIPE SIZES ARE NOMINAL INSIDE DIAMETER.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/22/99	B.J.	DRAWING ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR. 22, 1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR. 22, 1999 DATE
DEPUTY DIRECTOR

(METRIC)

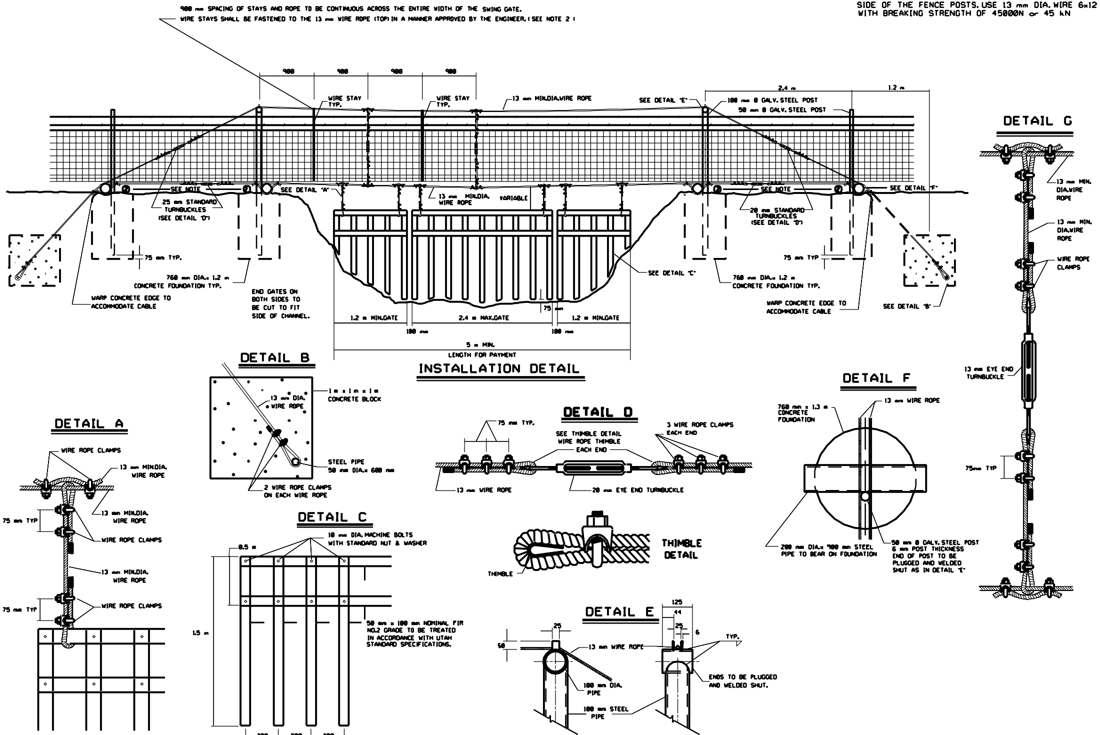
DEER GATES

STANDARD DRAWING TITLE

STD. DWG. NO.
720-1D

NOTES:

1. INSTALLATION OF BEARING PIPES, CONCRETE BLOCKS AND TURN BUCKLES SHALL BE THE SAME ON BOTH SIDES OF THE CHANNEL.
2. WIRE ROPE SHALL BE INSTALLED ON THE UPSTREAM SIDE OF THE FENCE POSTS. USE 13 mm DIA. WIRE 6x12 WITH BREAKING STRENGTH OF 45000N or 45 kN



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

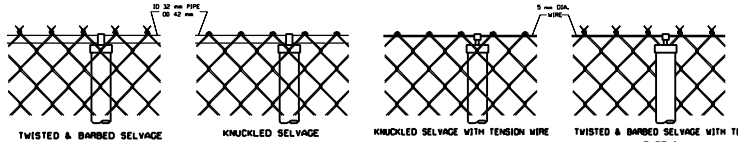
NO	DATE	BY	REMARKS
1	04/27/99	B.A.	CORRECT SPELLING

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — APR.27,1999 DATE
APPROVED
DEPUTY DIRECTOR — APR.27,1999 DATE

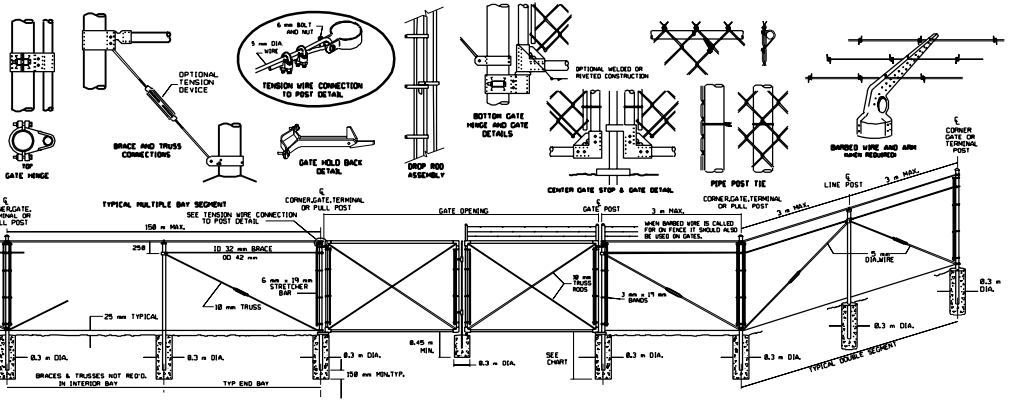
(METRIC)
SWING GATES
TYPE II
FOR GATES WIDER THAN 5 m
STANDARD DRAWING TITLE

STD. DWG. NO.
720-1E



(1) POSTS SHALL BE SCHEDULE 40 PIPE. TRIPLE COATED HIGH TENSILE STEEL PIPE OR ROLL-FORMED C-SECTION OF THE SIZE SHOWN IN THE CHART AND AS DEFINED IN THE STANDARD SPECIFICATION. WEIGHT IN kg/m WITH A TOLERANCE OF 8% OTHER. TYPES OF POSTS WITH EQUAL OR GREATER SECTION MODULUS MAY BE USED IF APPROVED IN ADVANCE BY THE ENGINEER.

(2) TRUSS RODS AND BRACES SHALL NOT BE REQUIRED FOR FABRIC HEIGHTS LESS THAN 1.5 m.



HEIGHT	GATE OPENING	GATE POST	GATE FRAME
UNDER 1.8 m	SINGLE TO 1.8 m OR DOUBLE TO 3.7 m	51 mm	25 mm
	SINGLE OVER 1.8 m TO 2.4 m OR DOUBLE OVER 3.7 m TO 4.8 m	64 mm	38 mm
	SINGLE OVER 2.4 m TO 3.7 m OR DOUBLE 4.8 m TO 7.3 m	89 mm	
1.8 m AND OVER *	SINGLE TO 1.8 m OR DOUBLE TO 3.7 m	64 mm	38 mm
	SINGLE OVER 1.8 m TO 4 m OR DOUBLE OVER 3.7 m TO 7.3 m	89 mm	
	SINGLE OVER 4 m TO 5.5 m OR DOUBLE OVER 7.3 m TO 11 m	152 mm	
	SINGLE OVER 5.5 m OR DOUBLE OVER 11 m	203 mm	

* GATES OVER 1.8 m IN HEIGHT AND WIDER THAN 3.7 m WILL REQUIRE 3 INDUSTRIAL PRESSED STEEL HINGES.

HEIGHT OF FABRIC	DEPTH OF POSTS	LENGTH OF END CORNER OR PULL POST	LENGTH OF LINE POSTS	SIZE OF POSTS								
				END, CORNER & PULL POSTS					LINE POST MIN.SIZE				
				NOM SIZE	OUTSIDE DIA	PIPE WEIGHT ASTM F-1083	PIPE WEIGHT TRIPLE COAT	OUTSIDE DIMENSIONS C-SECTION	NOM SIZE	OUTSIDE DIA	PIPE WEIGHT ASTM F-1083	PIPE WEIGHT TRIPLE COAT	OUTSIDE DIMENSIONS C-SECTION	kg/m
(m)	(m)	(m)	(m)	(mm)	(mm)			(mm)	(mm)	(mm)			(mm)	
2.2	1	3	2.9	64	73	8.6	6.9	51 x 41	51	60	5.4	4.6	48 x 41	3.36
1.8	1	2.7	2.6	51	60	5.4	4.6	38 x 41	38	48	4.8	3.3	48 x 41	2.75
1.5	1	2.4	2.3	51	60	5.4	4.6	38 x 41	38	48	4.8	3.3	48 x 41	2.75
1.2	0.6	1.8	1.7	51	60	5.4	4.6	38 x 41	38	48	4.8	3.3	48 x 41	2.75
0.9	0.6	1.5	1.4	51	60	5.4	4.6	38 x 41	38	48	4.8	3.3	48 x 41	2.75

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO	DATE	APPR.	REVISIONS
1	8/14/97		CORRECTED DIMENSION IN TYPICAL MULTIPLE BAY SEGMENT
2	8/25/98	FRW	REVISED TABLES AND ADDED NOTE.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

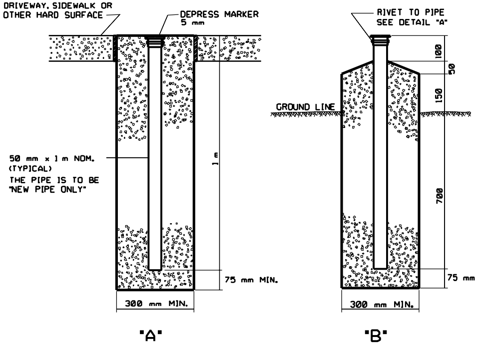
RECOMMENDED FOR APPROVAL — MARCH 1999 DATE

CHAIRMAN STANDARDS COMMITTEE
APPROVED — MARCH 1999 DATE

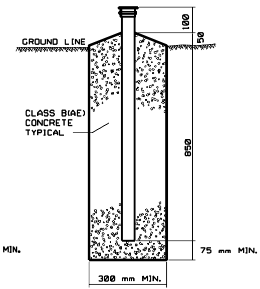
DEPUTY DIRECTOR

(METRIC)
CHAIN LINK FENCE
STANDARD DRAWING TITLE

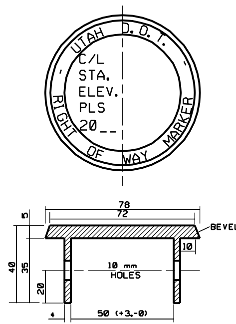
STD. DWG. NO.
720-3



ALTERNATE INSTALLATIONS

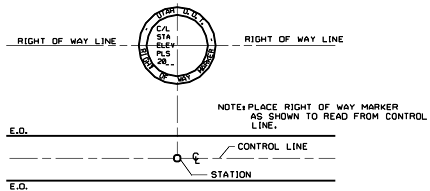


STANDARD INSTALLATION



BRONZE CAP

DETAIL "A"



NOTES:

1 - PLACE RIGHT OF WAY MARKERS AT EACH ANGLE POINT IN A RIGHT OF WAY LINE. WHERE THE RIGHT OF WAY PARALLELS THE CENTER LINE OF THE HIGHWAY AROUND A CURVE MARKERS SHALL BE PLACED ON EACH RIGHT OF WAY LINE OPPOSITE THE PS, SC, CS AND ST OR OPPOSITE THE PC AND PT.

2- RIGHT OF WAY MARKERS SHALL BE PLACED IN ADDITION SO THAT NO INTERVAL WILL EXCEED 250 m. PREFERABLY THESE INTERMEDIATE MARKERS SHOULD BE ON SECTION LINES OR INTERSECTING PROPERTY LINES.

3- ALL EXPOSED SURFACES OF THE BRONZE CAP ARE TO BE GROUND TO A SMOOTH SURFACE.

4- ALL LETTERS ARE TO BE DEPRESSED A MINIMUM OF 2 mm.

5- USE 5 mm HIGH LETTERS AND FIGURES.

6- USE ALTERNATE "A" INSTALLATION WHEN PLACING TOP OF BRONZE CAP FLUSH WITH HARD SURFACE AREA.

7- USE ALTERNATE "B" INSTALLATION WHEN PLACING MARKERS IN HEAVY BRUSH OR FOREST LANDS.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10/14/97		CORRECTED ERRORS ON CAP AND DETAIL "A" CORRECTED
2	10/28/98		CONCRETE CALLOUT IN STANDARD INSTALLATION DETAIL.
3	04/11/00		UPDATE FOR YEAR 2000

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — NOV.14,2000 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED

DEPUTY DIRECTOR — NOV.14,2000 DATE

(METRIC)

RIGHT OF WAY MARKER

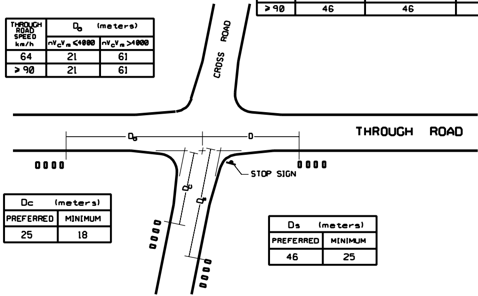
STANDARD DRAWING TITLE

STD. DWG. NO.

724-1

THROUGH ROAD SPEED km/h	D (meters)		
	$\frac{V_c}{1.5n - .5} \le 50$	$50 < \frac{V_c}{1.5n - .5} \le 400$	$\frac{V_c}{1.5n - .5} > 400$
64	21	30	30
≥ 90	46	46	61

THROUGH ROAD SPEED km/h	D_o (meters)	
	$nV_cV_m \le 4000$	$nV_cV_m > 4000$
64	21	61
≥ 90	21	61

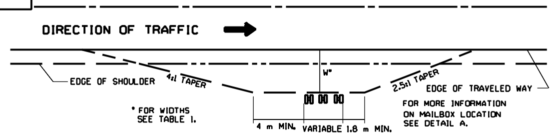


Dc (meters)	
PREFERRED	MINIMUM
25	18

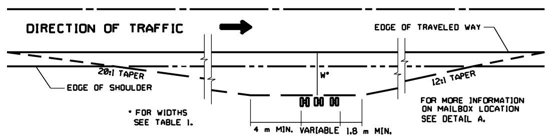
Ds (meters)	
PREFERRED	MINIMUM
46	25

V_c = AVERAGE DAILY TRAFFIC ON CROSS ROAD VEHICLES PER DAY
V_m = AVERAGE DAILY TRAFFIC ON THROUGH ROAD VEHICLES PER DAY
n = NUMBER OF MAILBOXES AT MAIL STOP

MINIMUM CLEARANCE DISTANCE TO NEAREST MAILBOX IN MAIL STOPS AT INTERSECTIONS



MAIL STOP LAYOUT FOR ROADS CARRYING LOW TRAFFIC SPEEDS OF 64 km/h OR LESS AND FOR LOCAL AND COLLECTOR ROADS CARRYING FEWER THAN 400 VEHICLES PER DAY

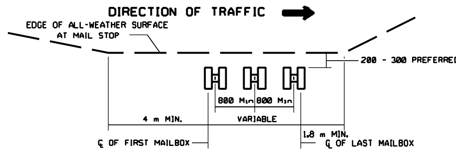


MAIL STOP LAYOUT FOR ROADS CARRYING HIGH SPEED TRAFFIC GREATER THAN 64 km/h

LATERAL PLACEMENT OF MAILBOXES
TABLE 1

HIGHWAY TYPE AND TRAFFIC CONDITIONS	WIDTH OF ALL-WEATHER SURFACE OF TURNOUT OR AVAILABLE SHOULDER AT MAILBOX - meters		DISTANCE ROADSIDE FACE OF MAILBOX IS TO BE OFFSET BEHIND EDGE OF TURNOUT OR USABLE SHOULDER - mm	
	PREFERRED	MINIMUM	PREFERRED	MINIMUM
RURAL HIGHWAY ADT OVER 10,000 VPD	> 3.6	3.6	200 to 300	0
RURAL HIGHWAY ADT = 1,500 to 10,000 VPD	3.6	3.0		
RURAL HIGHWAY ADT = 100 to 1,500 VPD	3.0	2.4		
RURAL ROAD ADT under 100 VPD	2.4	1.8		
RURAL ROAD ADT under 50 VPD SPEED = 64 km/h or LESS	1.8	0.6		
RESIDENTIAL STREET WITHOUT CURB OR ALL-WEATHER SHOULDER	0.6	0		200*
CURBED RESIDENTIAL STREET	NOT APPLICABLE		200 to 300 BEHIND TRAFFIC FACE OF CURB	150 BEHIND TRAFFIC FACE OF CURB

ADT = AVERAGE DAILY TRAFFIC   VPD = VEHICLES PER DAY
* IF A TURNOUT IS PROVIDED, THIS MAY BE REDUCED TO ZERO.



DETAIL A
MAILBOX LOCATION AT MAIL STOP

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

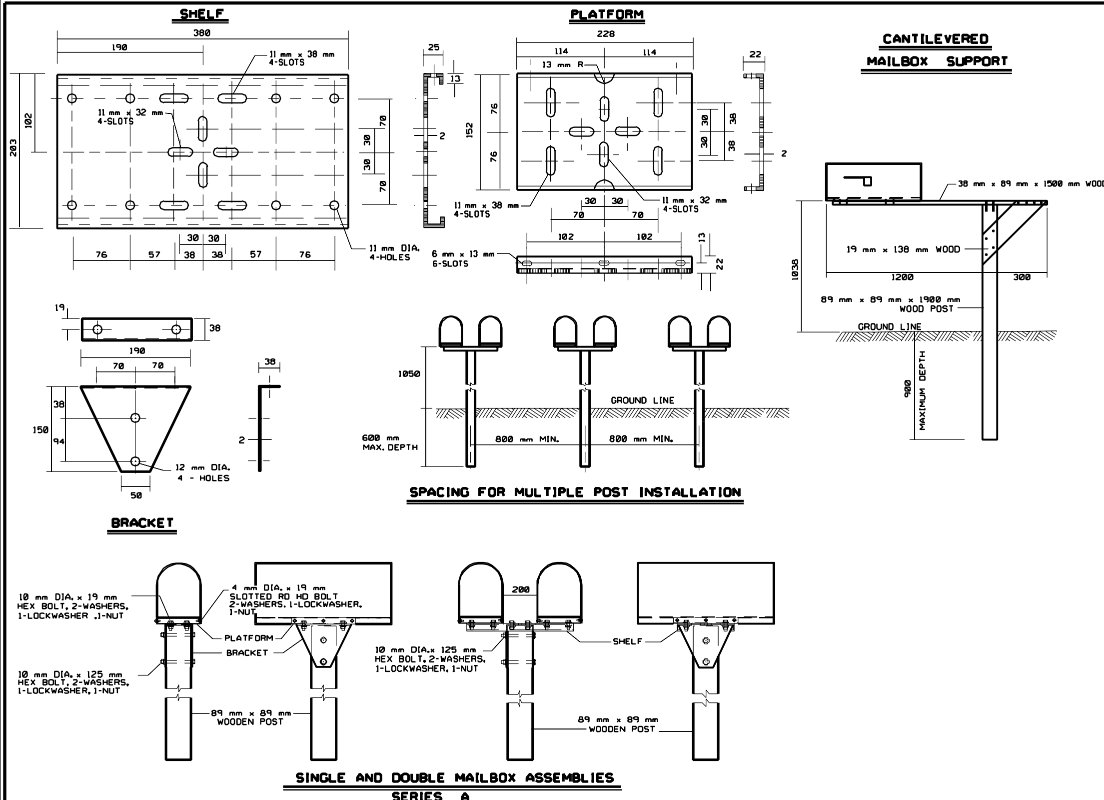
NO	DATE	APPR.	REVISIONS / REMARKS
1	03/10/98		CHANGE DRAWING NUMBER.
2	04/27/99	B.A.	CORRECT SPEED REFERENCE IN BOTTOM LEFT TABLE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — APR.27,1999 DATE
APPROVED — DEPUTY DIRECTOR — APR.27,1999 DATE

(METRIC)
NEWSPAPER AND MAILBOX STOP LAYOUT
STANDARD DRAWING TITLE

STD. DWG. NO.
725-1



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

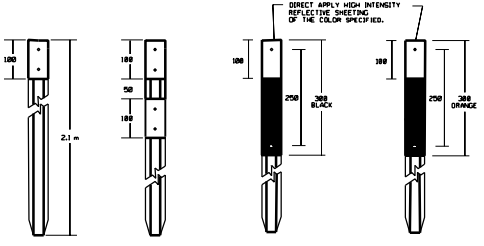
NO.	DATE	APPR.	REMARKS
1	02/10/98		ADD NOTES.
2	05/25/99	FRW	ADD SHELF AND PLATFORM DETAILS
3	06/16/99	FRW	CHANGED CANTILEVERED MAILBOX SUPPORT DIMENSIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUN.08,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED
DEPUTY DIRECTOR — JUN.08,1999 DATE

(METRIC)
NEWSPAPER AND MAILBOX SUPPORT HARDWARE
STANDARD DRAWING TITLE

STD. DWG. NO.
725-1A



TYPE I
SINGLE UNIT
(OF COLOR SPECIFIED)
SEE NOTE 1

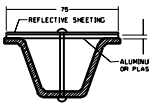
TYPE II
DOUBLE UNIT
SEE NOTE 1

CULVERT MARKER
SEE NOTE 2

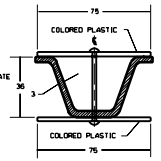
MAINTENANCE MARKER
SEE NOTE 2

NOTES:

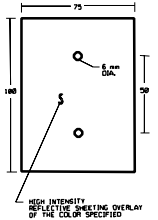
1. GALVANIZED STEEL POSTS MAY BE FABRICATED WITH 8 mm HOLES ON 25 mm SPACING. PUNCH HOLES ON CENTERLINE OF POST, TOP HOLE 25 mm FROM TOP OF POST. PUNCH HOLES THE FULL LENGTH OF THE POST.
2. CULVERT & MAINTENANCE MARKERS SHALL HAVE THE TOP 300 mm PAINTED WITH THE COLOR PAINT OR ATTACH 75 mm x 300 mm x 2.5 mm COLORED PLASTIC. BLACK OR ORANGE, WHEN BOTH MARKERS (CULVERT & MAINTENANCE) ARE REQUIRED ON ONE DELINEATOR, PLACE THE BLACK ABOVE THE ORANGE.
3. MOUNT BARRIER REFLECTORS ON THE CONCRETE BARRIER & BRIDGE PARAPETS WITH TWO 6 mm x 32 mm METAL HIT ANCHORS.
4. ON CONCRETE BARRIER MOUNT BARRIER REFLECTORS AS SHOWN ON STD.DWG.735-1C.
5. MOUNT STRAIGHT REFLECTORS ON WOOD POSTS WITH TWO 65 mm ELECTRO GALVANIZED RING SHANK NAILS WITH NEOPRENE WASHERS.
6. MOUNT STRAIGHT REFLECTORS ON STEEL POSTS WITH TWO 6 mm x 19 mm BOLTS & SELF LOCKING NUTS.
7. ON GUARDRAIL POSTS MOUNT BARRIER REFLECTORS AS SHOWN ON STD.DWG.735-1A.
8. DELINEATOR PLATE TO BE INSTALLED ONLY ON THE SIDE OF THE POST FACING TRAFFIC. PREFERRED ORIENTATION OF POST TO ONCOMING TRAFFIC IS AS SHOWN. HOWEVER, EXISTING POST WITH OPPOSITE ORIENTATION IS ACCEPTABLE. FOR INSTALLATION ON OPEN FACE SIDE USE TWO 6 mm DIA. EXPANSION RIVETS GRIP RANGE 35-41 mm FOR INSTALLATION ON OPPOSITE SIDE USE TWO 6 mm POP RIVETS WITH BACKING WASHER.



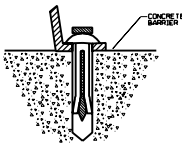
DELINEATOR INSTALLATION
SEE NOTE 8



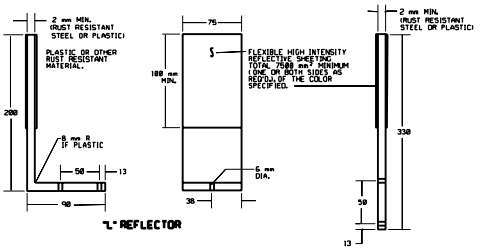
CULVERT/MAINTENANCE MARKER INSTALLATION
FOR 3 kg/m POST WITH COLORED PLASTIC ATTACHED. SEE NOTE 2.



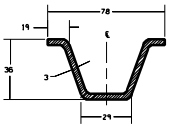
DELINEATOR PLATE



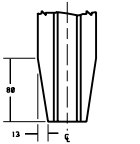
METAL HIT ANCHORS



BARRIER REFLECTORS



CROSS SECTION
FOR 3 kg/m POST



POST TAPER DETAIL

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
1	10/24/97	CORRECTED DELINEATOR INSTALLATION DETAIL TO SHOW PROPER PLACEMENT OF SHEETING.	
2	02/20/98	INSTALLATION AND MARKERS UPDATED, NOTE 8 ADDED. NOTE 4 CHANGED AND RENUMBERED.	
NO.		DATE APPR.	REMARKS

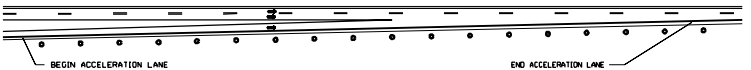
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — FEB.18 1998
STANDARDS STANDARDS COMMITTEE
APPROVED — FEB.18 1998
DEPUTY DIRECTOR — DATE

(METRIC)
DELINEATION HARDWARE
STANDARD DRAWING TITLE

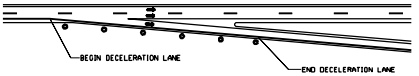
STD. DWG. NO.
726-1

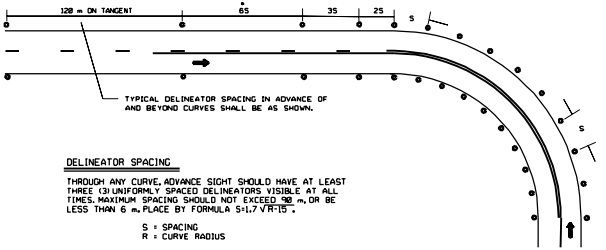
ACCELERATION LANE



TYPE II DELINEATORS REQUIRED AT 30 m SPACINGS ON ACCELERATION & DECELERATION LANES AS SHOWN.
USE ON ALL ACCELERATION LANES AND DECELERATION LANES

DECELERATION LANE

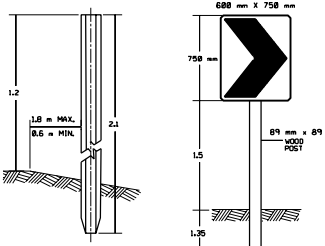




DELINEATOR SPACING

THROUGH ANY CURVE, ADVANCE SIGHT SHOULD HAVE AT LEAST THREE (3) UNIFORMLY SPACED DELINEATORS VISIBLE AT ALL TIMES. MAXIMUM SPACING SHOULD NOT EXCEED 90 m, OR BE LESS THAN 6 m, PLACE BY FORMULA $S=1.7\sqrt{R-15}$.

S = SPACING
R = CURVE RADIUS

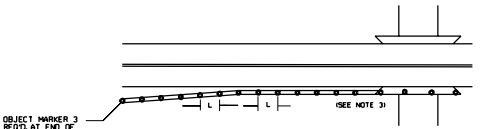


DELINEATOR

CHEVRON ALIGNMENT PANEL

NOTES:

1. BARRIERS ARE DEFINED AS BEING GUARDRAIL,CONCRETE BARRIER & BRIDGE PARAPET WALL.
2. MOUNT BARRIER REFLECTORS ON ENTIRE LENGTH OF BARRIER AS SHOWN ON STD. DRW. 735-1A & 735-1C. REFLECTOR SPACING (L) SHALL BE 15 m IN PERMANENT LOCATIONS & 7 m FOR TEMPORARY SITUATIONS. REFLECTOR COLOR SHALL BE THE SAME AS THE PAINT STRIPE.
3. IF GUARDRAIL IS NOT ATTACHED AN OBJECT MARKER 2 (OM-3R) SHALL BE INSTALLED IN PLACE OF DELINEATOR AT LEADING EDGE OF BRIDGE PARAPET.
4. IF POSTED SPEED EXCEEDS A CURVE ADVISORY SPEED BY 20 km/h OR GREATER, CHEVRON ALIGNMENT PANELS SHOULD BE CONSIDERED. ADVANCE SIGHT SHOULD HAVE AT LEAST TWO UNIFORMLY SPACED PANELS VISIBLE AT ALL TIMES. THE FIRST PANEL SHOULD BE VISIBLE AT LEAST 150 m BEFORE THE CURVE.



BARRIER REFLECTOR DETAIL

(SEE NOTE 2)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	REVISIONS
1	12-28-79	CLARIFY DELINEATOR SPACING.
2	8-2-82	CORRECT DIMENSION EXPLANATION.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE

APPROVED
DEPUTY DIRECTOR

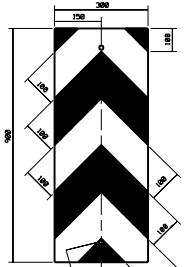
FEB.18 1980
DATE

FEB.18 1980
DATE

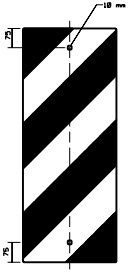
(METRIC)

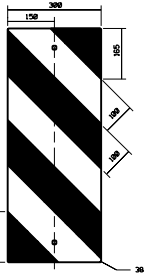
STANDARD DRAWING TITLE
DELINEATION APPLICATION

STD. DWG. NO.
726-2

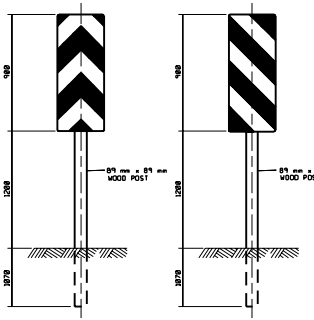


OBJECT MARKER 1

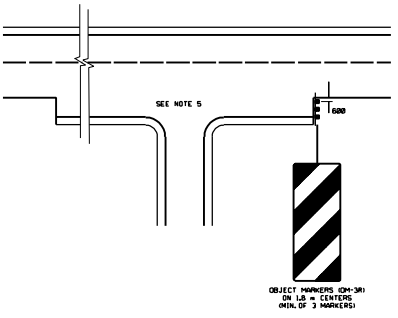




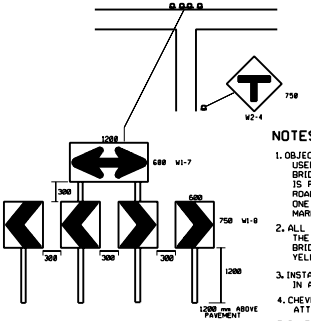
OBJECT MARKER 2



OBJECT MARKER 3



PAVEMENT TRANSITION



'T' INTERSECTION GUIDANCE

NOTES:

1. OBJECT MARKERS ARE USED TO MARK OBSTRUCTIONS. 1 & 2 ARE USED TO MARK THE ENDS OF OBSTRUCTIONS SUCH AS NARROW BRIDGES , CULVERTS, ETC. ON NARROW BRIDGES THE MARKER IS PLACED ON EACH SIDE OF BOTH ENDS OF BRIDGES ON TWO-WAY ROADWAYS & ON EACH SIDE OF THE APPROACH END OF BRIDGES ON ONE WAY ROADWAYS. OBJECT MARKER 3 IS USED PRINCIPALLY FOR MARKING THE BEGINNING ENDS OF BARRIERS.
2. ALL REFLECTIVE SHEETING SHALL CONFORM TO SECTION 735 OF THE STATE OF UTAH STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION. THE COLOR OF THE SHEETING SHALL BE YELLOW WITH NON-REFLECTIVE BLACK.
3. INSTALL THREE DELINEATOR PLATES, YELLOW, IN ACCORDANCE WITH STANDARD DRAWING 726-1.
4. CHEVRON ALIGNMENT PANELS & OBJECT MARKERS 1 & 2 SHALL BE ATTACHED TO POSTS WITH VANDAL RESISTANT FASTENERS.
5. PAVEMENT MARKINGS AND STRIPING FOR PAVEMENT TRANSITION IS TO BE DETERMINED BY THE TRAFFIC ENGINEER.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	REVISIONS	DATE	APPR.
1	82/18/98	OBJECT MARKER NOTE 3 CHANGED TO AGREE WITH STD.DRAWING 726-1	

REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

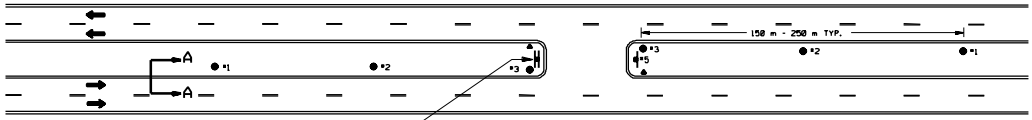
RECOMMENDED FOR APPROVAL — FEB.18 1998
CHAIRMAN STANDARDS COMMITTEE
APPROVED — FEB.18 1998
DEPUTY DIRECTOR — DATE

(METRIC)

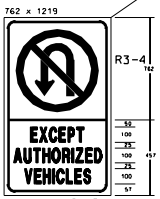
OBJECT MARKERS
'T' INTERSECTION & PAVEMENT TRANSITION GUIDANCE

STANDARD DRAWING TITLE

STD. DWG. NO.
726-3



FREEWAY TURN AROUND

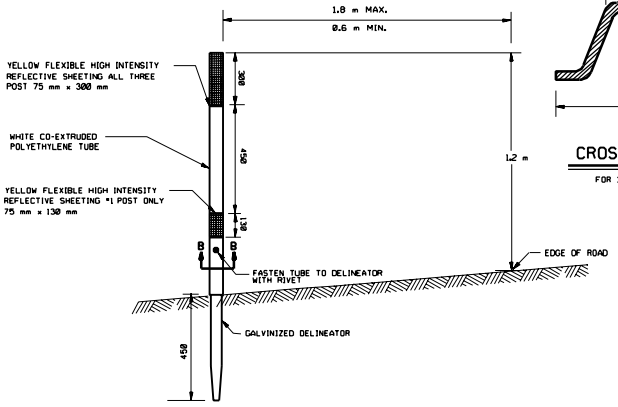


SIGN

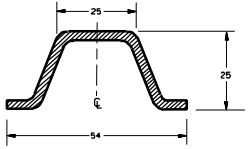
LEGEND

● = WHITE FLEXIBLE GUIDE POST

▲ = TYPE II DELINEATOR

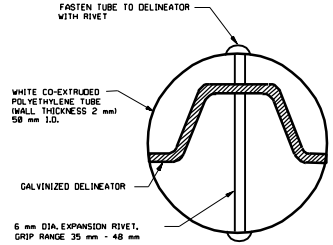


SECTION A-A



CROSS SECTION

FOR 1.8 kg/m POST



SECTION B-B

SEE NOTE 2.3

NOTES:

1. USE EXISTING DELINEATOR SPACING WHEN POSSIBLE. POST *2 SPACED EVENLY BETWEEN POST *1 & *3. POST *3 PLACE 3 m IN ADVANCE OF PT.
2. GALVANIZED STEEL POST WITH 8 mm HOLES ON 25 mm SPACING, FULL LENGTH OF POST. ATTACH WHITE POLYETHYLENE TUBE WITH REFLECTIVE SHEETING AS SHOWN.
3. OTHER APPROPRIATE WHITE FLEXIBLE GUIDE POST MAYBE USED UPON APPROVAL FROM ENGINEER FOR MAINTENANCE.
4. INSTALL TYPE II DELINEATOR AS SHOWN.
5. WHERE THE MEDIAN IS SEPARATED BY MORE THAN 45 M USE A SIGN AT EACH END OF CROSSING ADJACENT TO APPROACHING TRAFFIC.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	11-14-08	J.L.	ADDED SIGN R3-4 AND NOTE 5

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — NOV 14, 2008 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — NOV 14, 2008 DATE

DEPUTY DIRECTOR

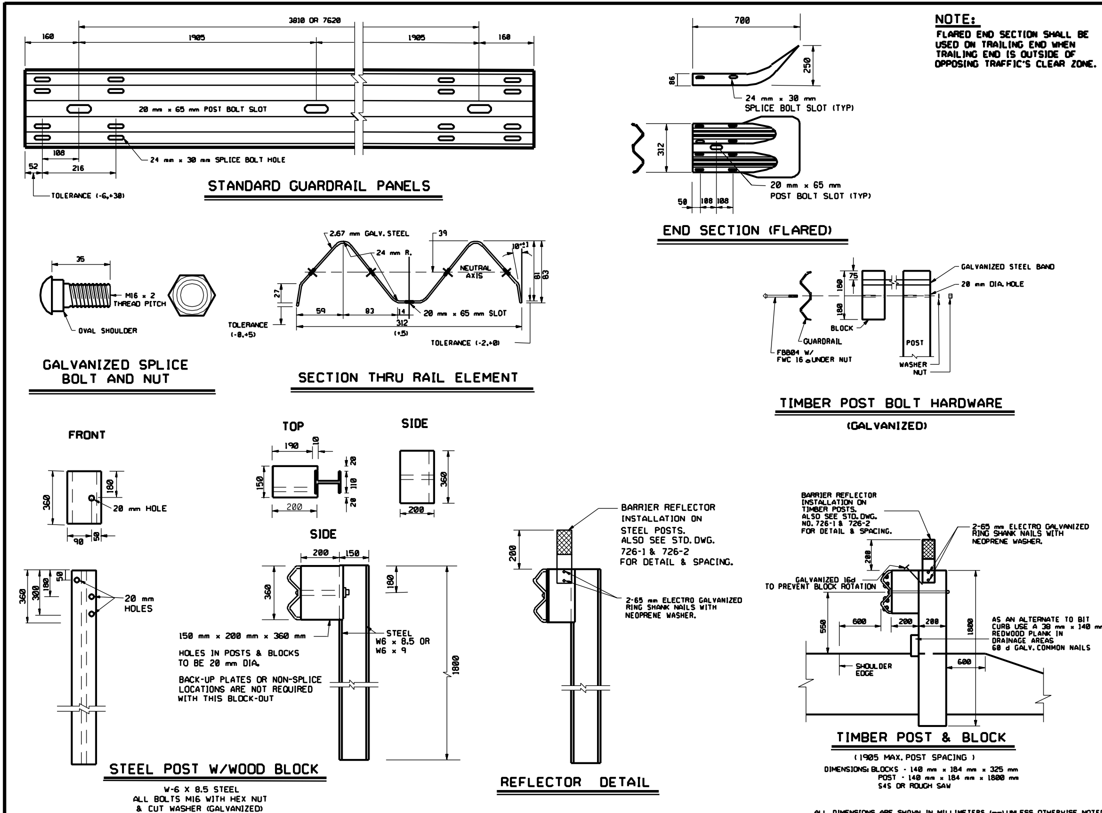
(METRIC)

STANDARD DRAWING TITLE

FREEWAY TURN AROUND MARKINGS

STD. DWG. NO.

726-4



REVISIONS

NO.	DATE		REMARKS
1.	05/12/98		DELETE STEEL POST & BLOCK, ADD WOOD BLOCK & STEEL POST.
2.	07/14/98		ADDED NOTE TO STEEL POST W/WOOD BLOCK FOR TYPE OF STEEL AND BOLT.
3.	09/08/98		MOVE REFLECTOR ONTO WOOD BLOCK IN REFLECTOR DETAIL AND CORRECT DIMENSION ARROW ON STANDARD GUADRAIL PANELS DETAIL.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — SEP. 08, 1998 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — SEP. 08, 1998 DATE

DEPUTY DIRECTOR

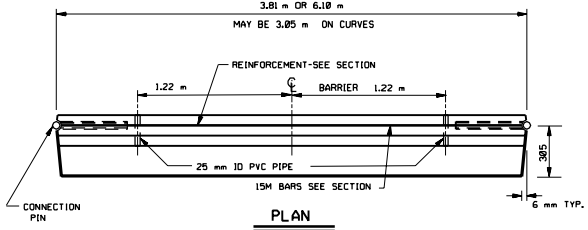
(METRIC)

BEAM GUARDRAIL HARDWARE

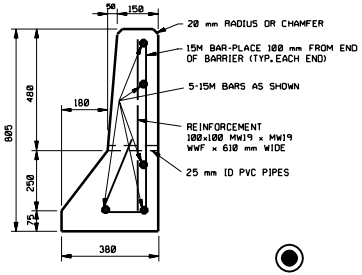
STANDARD DRAWING TITLE

STD. DWG. NO.

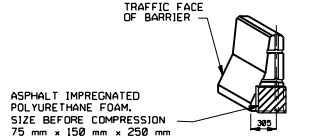
735-1A



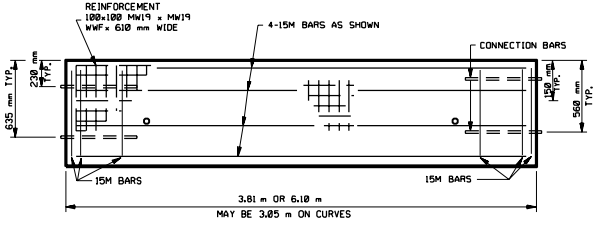
PLAN



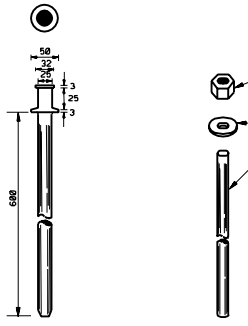
SECTION



BARRIER SEAL



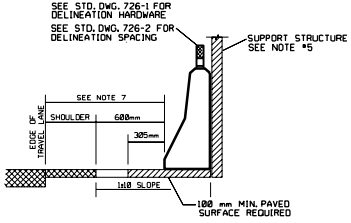
ELEVATION



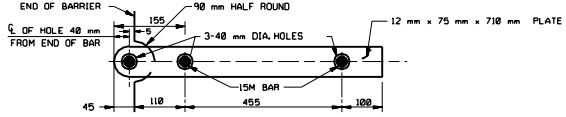
CONNECTION PINS

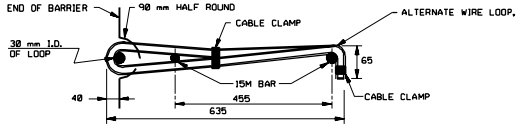
NOTES

1. COVER TO REINFORCING STEEL SHALL BE 40 mm MIN. EXCEPT WHERE NOTED OTHERWISE.
2. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 20 mm
3. PLACE AN ADEQUATE AMOUNT OF SILICONE ADHESIVE ON BOTTOM OF WASHER BEFORE INSERTING PIN TO HOLD IN PLACE AND PREVENT EASY HAND REMOVAL. FILL NUT WITH GREASE TO EXCLUDE ICE OR OTHER CONTAMINANTS.
4. 3 mm TAPER ON ALL NOTCHES TO FACILITATE FORM REMOVAL.
5. PRECAST HALF BARRIER SHALL BE PLACED WHERE THERE IS A SUPPORT STRUCTURE BEHIND EACH SECTION (IE: SOUND WALL, MSE WALL etc.)
6. PRECAST HALF BARRIER SHALL NOT BE USED AS AN ALTERNATE, OR IN CONJUNCTION WITH PRECAST CONCRETE FULL BARRIER SECTIONS IN A WORK ZONE.
7. REFER TO AASHTO ROADSIDE DESIGN GUIDE FOR SHY DISTANCE REQUIREMENTS. SHOULDER WIDTH PLUS 600 mm MUST EQUAL OR EXCEED SHY DISTANCE.



ELEVATION





CONNECTION BAR

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	01/13/98		CONNECTION BAR DIMENSIONS CORRECTED, PAD ADDED TO ELEVATION DETAIL, NOTE 4 CHANGED, SECTION DETAIL CORRECTED.
2	04/22/99	R.A.	DRAWING ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.
3	05/17/00	G.S.	ADDED SUPPORT STRUCTURE TO ELEVATION VIEW AND NOTES 5 AND 6
4	05/31/01	G.S.	REVISED ELEVATION DETAIL, ADDED NOTE NO.7

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

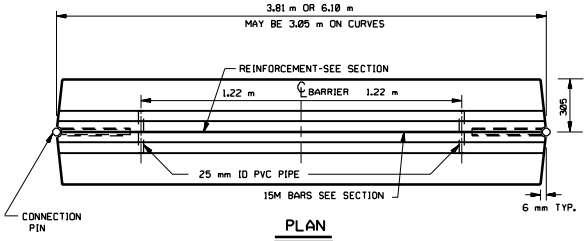
RECOMMENDED FOR APPROVAL — JUL.10.2001 DATE
COMMITTEE STANDARDS COMMITTEE
APPROVED — JUL.10.2001 DATE
DEPUTY DIRECTOR

(METRIC)

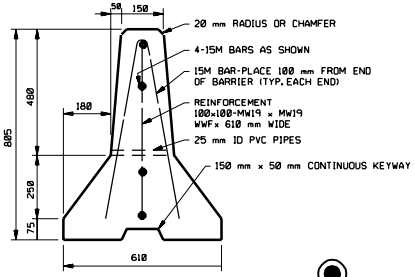
PRECAST CONCRETE HALF BARRIER STANDARD SECTION

STANDARD DRAWING TITLE

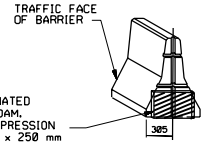
STD. DWG. NO.
735-1B



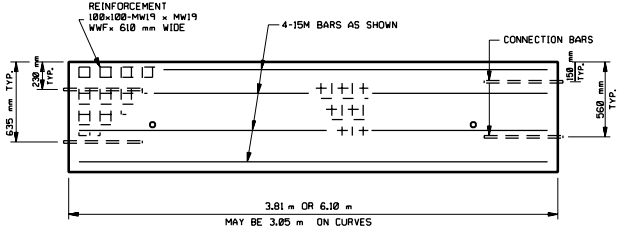
PLAN



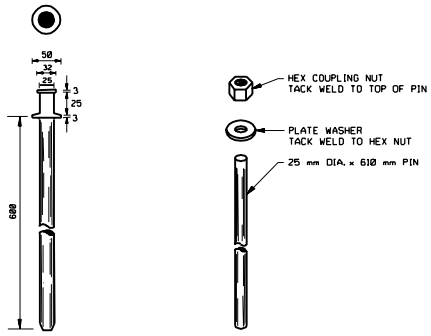
SECTION



BARRIER SEAL



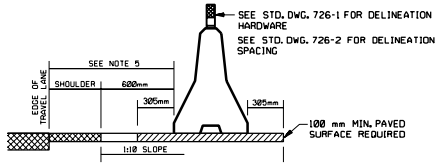
ELEVATION



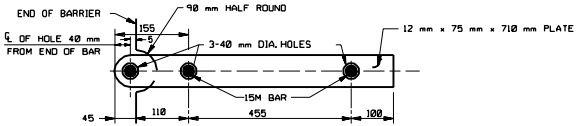
CONNECTION PINS

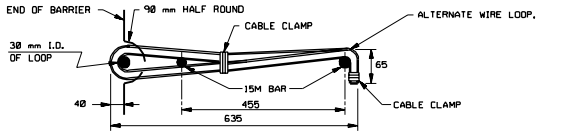
NOTES

1. COVER TO REINFORCING STEEL SHALL BE 40 mm MIN. EXCEPT WHERE NOTED OTHERWISE.
2. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 20 mm
3. PLACE AN ADEQUATE AMOUNT OF SILICONE ADHESIVE ON BOTTOM OF WASHER BEFORE INSERTING PIN TO HOLD IN PLACE AND PREVENT EASY HAND REMOVAL. FILL NUT WITH GREASE TO EXCLUDE ICE OR OTHER CONTAMINANTS.
4. 3 mm TAPER ON ALL NOTCHES TO FACILITATE FORM REMOVAL.
5. REFER TO AASHTO ROADSIDE DESIGN GUIDE FOR SHY DISTANCE REQUIREMENTS. SHOULDER WIDTH PLUS 600 mm MUST EQUAL OR EXCEED SHY DISTANCE.



ELEVATION





CONNECTION BAR

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
1	01/13/98		CONNECTION BAR DIMENSIONS CORRECTED, PAD ADDED TO ELEVATION DETAIL. NOTE 4 CHANGED. SECTION DETAIL
2	04/22/98	B.A.	CORRECTED. ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.
3	05/31/01	G.S.	REVISED ELEVATION DETAIL. ADDED NOTE NO. 5.
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JUL.10.2001 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — JUL.10.2001 DATE

DEPUTY DIRECTOR

(METRIC)

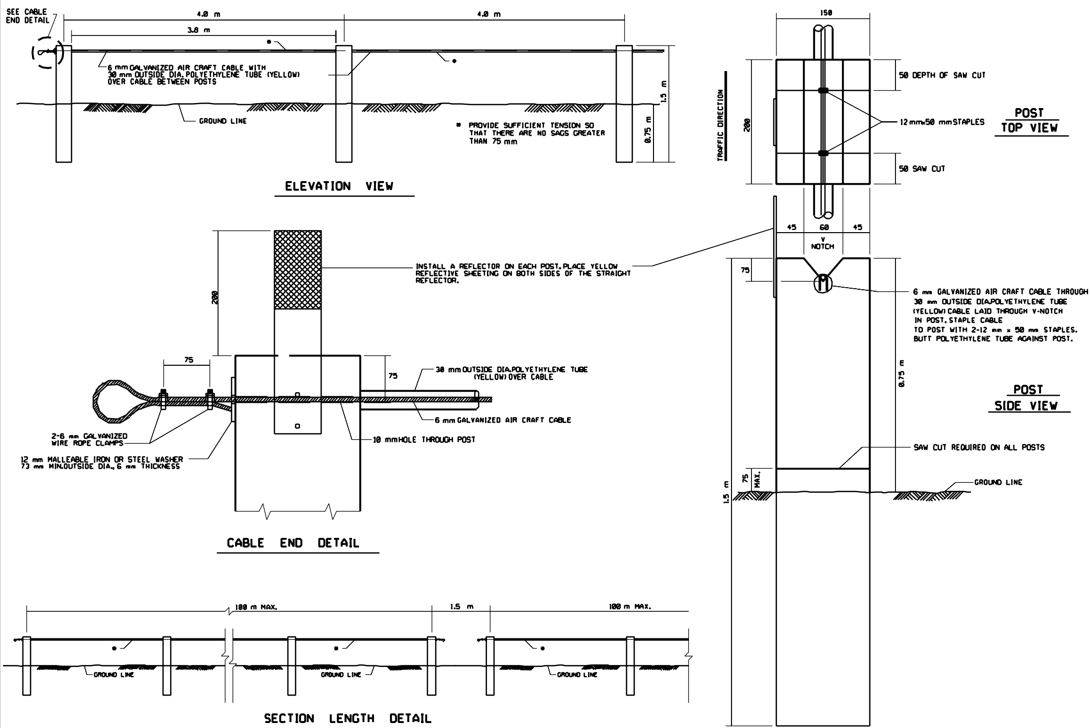
PRECAST CONCRETE FULL BARRIER STANDARD SECTION

STANDARD DRAWING TITLE

STD. DWG. NO.

735-1C

TRAFFIC CONTROL CABLE



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/27/99	B.A.	CORRECT DIMENSION NOTE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — APR.27,1999 — DATE

APPROVED

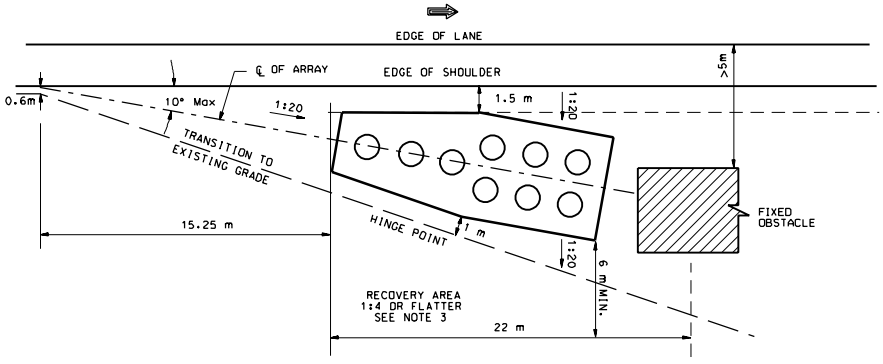
DEPUTY DIRECTOR — APR.27,1999 — DATE

(METRIC)

TRAFFIC CONTROL CABLE

STANDARD DRAWING TITLE

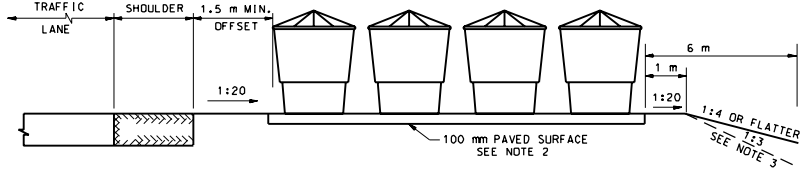
STD. DWG. NO.
735-10

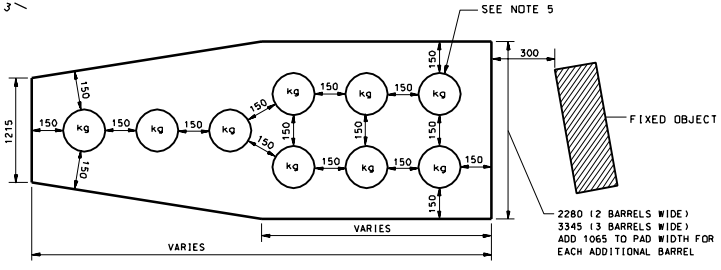


FOR ILLUSTRATION ONLY

ACTUAL DESIGNS WILL BE SITE SPECIFIC

SEE NOTE 1





NOTES:

1. USE ENERGITE III SYSTEM MANUAL FOR DESIGN CRITERIA. MANUAL INCLUDED IN GUIDELINES FOR ATTENUATORS AND END SECTIONS OR IS AVAILABLE FROM THE DIVISION OF TRAFFIC AND SAFETY.
2. CONSTRUCT PAD USING HOT MIX ASPHALT OR PORTLAND CEMENT CONCRETE.
3. USE A 1:4 SLOPE IN THE RECOVERY AREA WHEN POSSIBLE. A MAXIMUM 1:3 SLOPE MAY BE USED. COMPLETELY CLEAR RECOVERY AREA OF ANY FIXED OBJECTS.
4. COMPLETE GRADING REQUIREMENTS PRIOR TO INSTALLING SYSTEM.
5. MARK EACH BARREL POSITION ON THE PAD AND THE AMOUNT OF SAND REQUIRED FOR EACH BARREL. USE ORANGE FLOURESCENT PAINT FOR THIS OPERATION.
6. USE OF SAND BARREL ARRAYS IN CONSTRUCTION ZONE CAN BE PERMITTED WHEN ALL CONDITIONS ARE MET. DESIGN SAND BARREL ARRAY FOR THE SPEED WHICH WAS POSTED PRIOR TO CONSTRUCTION.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	REMARKS
1	06/05/98	NOTE AND DETAIL REMOVED
2	07/14/98	CHANGED METRIC TO READ "FOR ILLUSTRATION ONLY"
3	10/25/98	CHANGED SLOPE CALLOUT.
4	05/25/99	ADDED NOTE.
5	06/21/99	G.S. ADDED NOTES. BARREL LAYOUT AND BARREL WEIGHTS
6	06/25/01	G.S. ADDED RECOVERY DETAILS. RENUMBERED NOTES. ADDED NOTES 3, 4, &
		C.F.S.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JULY 10,2001 DATE

CHAIRMAN STANDARDS COMMITTEE
APPROVED — JULY 10,2001 DATE

DEPUTY DIRECTOR

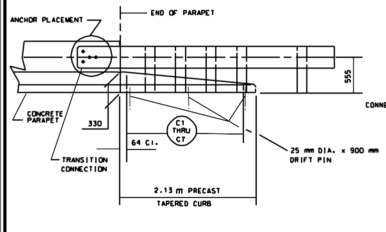
(METRIC)

STANDARD DRAWING TITLE

SAND BARREL DETAILS

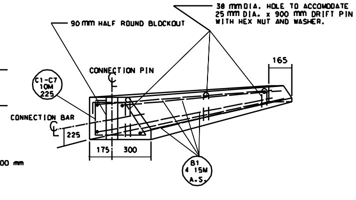
STD. DWG. NO.

735-1E



ELEVATION

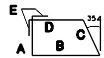
(RIGHT SIDE SHOWN LEFT SIDE SIMILAR.)



REBAR PLACEMENT

FOR PRECAST CONCRETE TAPERED CURB SECTION

REINFORCING STEEL SCHEDULE



TYPE 1

(FOR 1 SECTION ONLY)

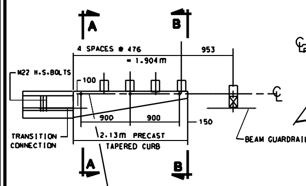
BENT BARS (ALL DIMENSIONS ARE OUT TO OUT)

MARK	SIZE	NO.	TYPE	LENGTH	A	B	C	D	E
C1	10M	1	1	1280	230	370	280	220	90
C2				1200	210	350	250	210	
C3				1100	180	320	220	200	
C4				990	160	280	200	170	
C5				910	140	260	170	160	
C6				790	120	220	140	130	
C7	10M	1	1	740	110	200	130	120	90

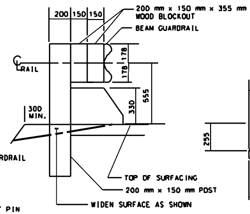
STRAIGHT BARS

MARK	SIZE	NO.	LENGTH	
B1	15M	4	2000	
B2	15M	2	200	

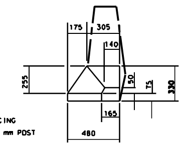
NOTE: ALL REINFORCING BARS TO HAVE 40 mm MINIMUM COVER.



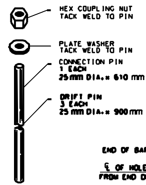
PLAN



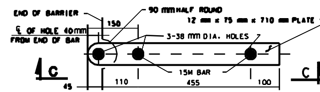
SECTION A-A



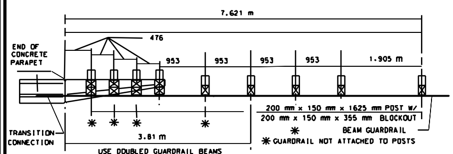
SECTION B-B



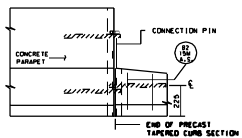
CONNECTION PIN & DRIFT PIN



CONNECTION BAR

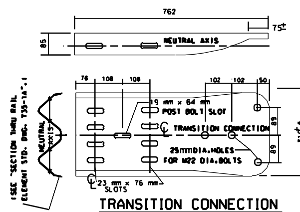


POST PLACEMENT



CONNECTION BAR PLACEMENT DETAIL

SECTION C-C



TRANSITION CONNECTION

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	01/13/98		CONNECTION BAR DIMENSIONS CORRECTED.
2	09/08/98		CORRECT ROUNDING ERROR AND MOVE TOP ARROW IN POST PLACEMENT DETAIL.
3	04/27/99	B.A.	CORRECT BAR DESIGNATON

UTAH DEPARTMENT OF TRANSPORTATION
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SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — APR. 27, 1999 DATE

APPROVED

DEPUTY DIRECTOR — APR. 27, 1999 DATE

(METRIC)

GUARDRAIL TRANSITION

STANDARD DRAWING TITLE

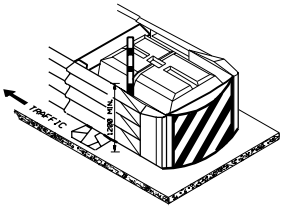
STD. DWG. NO.
735-1F

ATTENUATOR

TYPE "E"

THE APPROPRIATE OBJECT MARKER SHEETING, 0.20 m² SHALL BE PLACED ON THE LEAD BARREL OF ARRAY. PLACEMENT SHALL BE 50 mm FROM TOP OF BARREL.

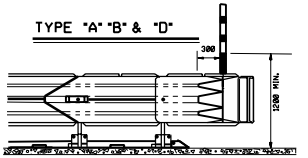
TYPE "A" "B" & "D" *



THE APPROPRIATE OBJECT MARKER PLATE, 0.20 m², 1450 mm x 450 mm SHALL BE ATTACHED ON THE NOSE OF THE UNIT AT THE TOP AND TO THE SIDE OF THE NEAREST TRAVELED LANE. IF IN A CORE AREA THE OBJECT MARKER SHALL BE CENTERED.

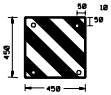
*REACT 350 OBJECT MARKER SUPPLIED BY MANUFACTURES. NO OTHER MARKINGS REQUIRED.

TYPE "A" "B" & "D"



MARKER POST SHALL BE MOUNTED INSIDE NOSE, PLACED 300 mm FORWARD OF BACK EDGE OF NOSE PIECE TO THE SIDE NEAREST APPROACHING TRAVEL LANE. PLACE AT A MINIMUM OF 1200 mm FROM BOTTOM OF LOWER REFLECTIVE MATERIAL TO MOUNTING PAD. IN CORE APPLICATIONS PLACE MARKER POST ON BOTH SIDES OF DEVICE.

MARKER PLATE

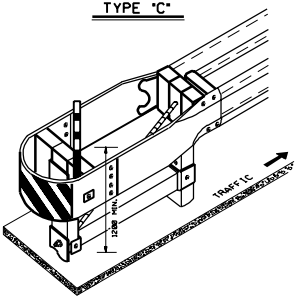


MARKER PLATER SHALL BE 0.032 GAGE ALUMINUM WITH APPROPRIATE OBJECT MARKER SHEETING.

MOUNTING HARDWARE

4-8 mm x 25 mm ZINC PLATED BOLTS
8-8 mm ZINC PLATED WASHERS
4-8 mm ZINC PLATED NUTS

TYPE "C"

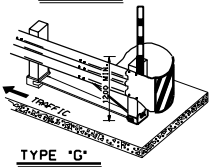


THE APPROPRIATE OBJECT MARKER SHEETING, 0.20 m² 1600 mm x 350 mm, SHALL BE PLACED ON NOSE OF UNIT AT THE TOP AND OFFSET 150 mm FROM CENTER TOWARDS THE APPROACHING LANE OF TRAFFIC.

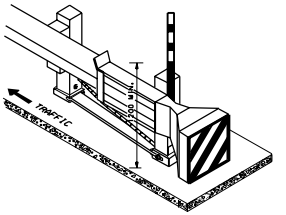
END SECTION TYPICALS

END SECTION TYPE "F".
THIS DEVICE HAS A BELTING MATERIAL AS A NOSE PIECE AND STEEL POST. OBJECT MARKER MOUNTING SIMILAR TO THAT OF END SECTION TYPE "H". AND MARKER POST IS MOUNTED IN A SIMILAR MANNER AS ATTENUATOR TYPE "B".

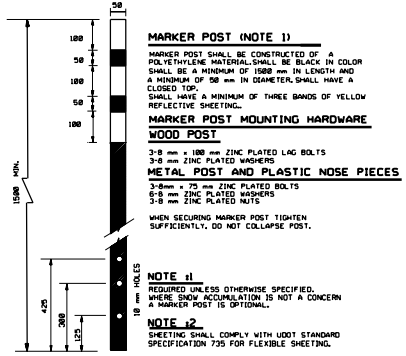
TYPE "H"



TYPE "G"



THE APPROPRIATE OBJECT MARKER SHEETING, 0.20 m² 1450 mm x 450 mm, SHALL BE PLACED ON NOSE OF UNIT MARKER POST SHALL BE MOUNTED ON POST #1 NEXT TO DIAGONAL BEAM, AT A MINIMUM OF 1200 mm, FROM BOTTOM OF REFLECTIVE MATERIAL TO PAD OR GROUND SURFACE.



MARKER POST (NOTE 1)

MARKER POST SHALL BE CONSTRUCTED OF A POLYETHYLENE MATERIAL.SHALL BE BLACK IN COLOR SHALL BE A MINIMUM OF 1500 mm IN LENGTH AND A MINIMUM OF 50 mm IN DIAMETER. SHALL HAVE A CLOSED TOP. SHALL HAVE A MINIMUM OF THREE BANDS OF YELLOW REFLECTIVE SHEETING.

MARKER POST MOUNTING HARDWARE

WOOD POST

3-8 mm x 100 mm ZINC PLATED LAG BOLTS
3-8 mm ZINC PLATED WASHERS

METAL POST AND PLASTIC NOSE PIECES

3-8mm x 75 mm ZINC PLATED BOLTS
6-8 mm ZINC PLATED WASHERS
3-8 mm ZINC PLATED NUTS

WHEN SECURING MARKER POST TIGHTEN SUFFICIENTLY. DO NOT COLLAPSE POST.

NOTE #1

REQUIRED UNLESS OTHERWISE SPECIFIED. WHERE SNOW ACCUMULATION IS NOT A CONCERN A MARKER POST IS OPTIONAL.

NOTE #2

SHEETING SHALL COMPLY WITH UDOT STANDARD SPECIFICATION 735 FOR FLEXIBLE SHEETING.

MARKER POST

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	REMARKS
1		ADD SHEETING COLOR IN MARKER POST DETAIL. MARKER POST NOTE.
2	10/21/98	GS ADDED NOTES TO END SECTION TYPICALS AND ATTENUATOR TYPE "A" & "D"

REVISIONS

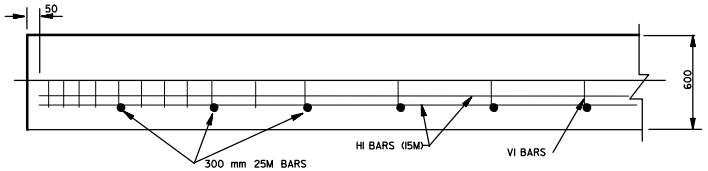
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC. 14, 1998 — DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED
DEPUTY DIRECTOR — DEC. 14, 1998 — DATE

(METRIC)
ATTENUATOR/END SECTION MARKINGS
STANDARD DRAWING TITLE

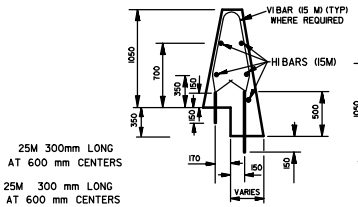
STD. DWG. NO.
735-1C

REINFORCING DETAILS

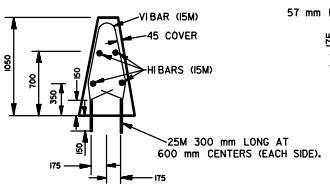


NOTE: CONCRETE ON BOTTOM HALF OF PLAN VIEW IS REMOVED IN ORDER TO SHOW REINFORCING DETALS.

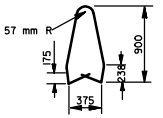
PLAN VIEW
(SYMMETRICAL ABOUT CENTER LINE)



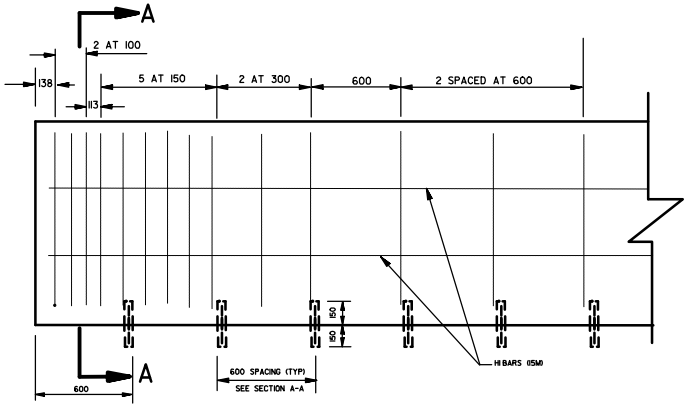
SECTION A-A
(STEPPED PAVEMENT)



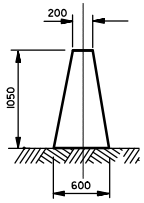
SECTION A-A



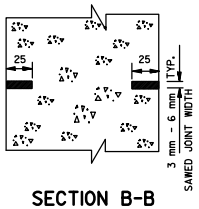
VIBAR (15 M)



ELEVATION



TYPICAL SECTION



SECTION B-B

GENERAL NOTES

1- ANY METHOD DEVISED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL ROADWAY STEEL WILL BE POSITIONED +/- 12 mm AS DIMENSIONED WILL BE SATISFACTORY.

2- THE CONTRACTOR HAS THE OPTION TO SLIP- FORM THE BARRIER, IN WHICH CASE, ADDITIONAL REINFORCEMENT MAY BE TIED TO THE UPPER TWO-THIRDS OF THE REINFORCING CAGE TO PROVIDE BRACING.

3- BARRIER SHALL NOT BE USED TO SUPPORT HIGHWAY LIGHTING POLES.

4- BARRIER IS NOT TO BE USED FOR BRIDGE ROADWAY APPLICATIONS.

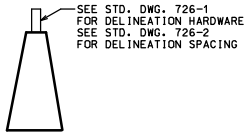
5- DELINEATORS TO BE MOUNTED ON MEDIAN BARRIERS SHALL BE YELLOW WHERE THE BARRIER IS ON THE LEFT IN THE DIRECTION OF TRAFFIC; SHALL BE WHITE WHERE THE BARRIER IS ON THE RIGHT IN THE DIRECTION OF TRAFFIC; AND SHALL BE DOUBLE YELLOW WHERE THE BARRIER IS IN THE MEDIAN WITH TRAFFIC IN EACH DIRECTION.

6- ANCHOR DEVICES SHALL BE EITHER ALUMINUM OR GALVANIZED STEEL AND SHALL BE EXPANSIVE BOLTS OR ADHESIVE SELF-GROUTING BOLTS. IF GALVANIZED STEEL BOLTS ARE USED, A NON-CONDUCTIVE WASHER SHALL BE USED BEWEEN THE ALUMINUM ALLOY SUPPORT ANGLE AND THE HEAD OF THE BOLT.

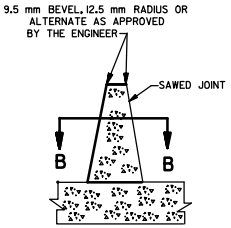
7- SAWED JOINTS SHALL BE LOCATED AT PAVEMENT TRANSVERSE JOINTS.

8- ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO M284 OR M III AND M31M GRADE 400, RESPECTIVELY.

9- ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS AA(AE) EXCEPT WHERE SPECIFIED OTHERWISE.



DELINEATION HARDWARE AND SPACING



SECTION THROUGH SAWED JOINT

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/27/99	B.A.	CORRECT BAR DESIGNATION

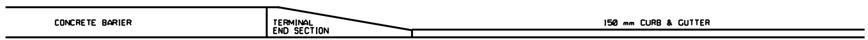
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.27.1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.27.1999 DATE
DEPUTY DIRECTOR

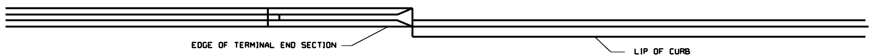
(METRIC)
CAST IN PLACE CONSTANT SLOPE BARRIER
STANDARD DRAWING TITLE

STD. DWG. NO.
735-1H

PLAN A1: SPEEDS UP TO 50 km/h

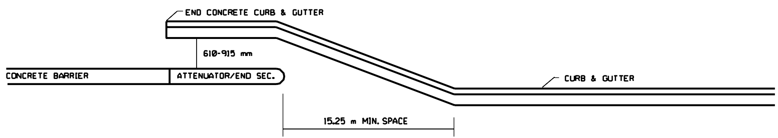


PROFILE VIEW



PLAN VIEW

PLAN A2: SPEEDS OVER 50 km/h



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE		REMARKS
1	02/01/00	B.A.	CORRECT ARROW LOCATION FOR LIP OF CURVE IN PLAN VIEW

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — FEB.08,2000 DATE
APPROVED

DEPUTY DIRECTOR — FEB.08,2000 DATE

(METRIC)

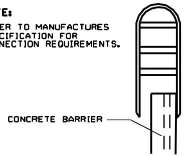
DRAINAGE ATTENUATOR/ END SECTION GUIDELINE "A"

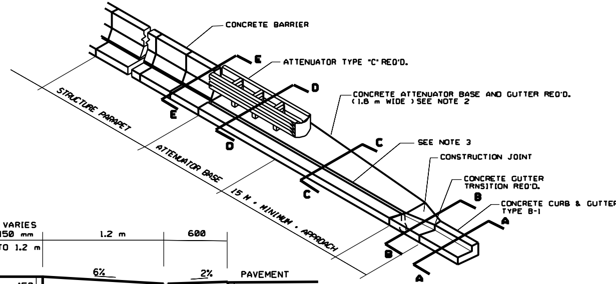
STANDARD DRAWING TITLE

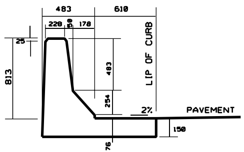
STD. DWG. NO.
735-1 1

ATTENUATOR CONNECTION

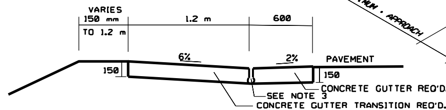
NOTE:
REFER TO MANUFACTURES SPECIFICATION FOR CONNECTION REQUIREMENTS.



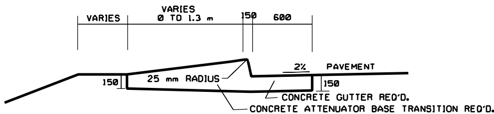




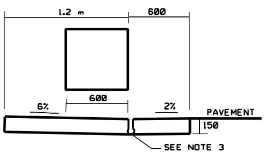
SECTION E-E



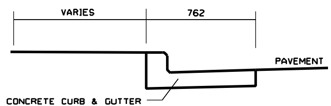
SECTION C-C



SECTION B-B



SECTION D-D



SECTION A-A

NOTES

1. ALTERNATIVE INSTALLATION TO GUIDELINE "A" PLAN A2 FOR ATTENUATOR TYPE A, B, & D
2. ATTENUATOR BASE MUST BE REINFORCED CONCRETE AS PER MANUFACTURES SPECIFICATIONS.
3. IF PARALLEL ROAD SURFACE IS 1% OR GREATER A DRAINAGE SYSTEM WHICH DOES NOT CREATE A RAISED CURB IN FRONT OF OR TO THE SIDES OF THE ATTENUATOR SYSTEM, MUST BE DESIGNED. THE SLOTTED DRAINAGE SYSTEM IS AN OPTION.
4. ATTENUATOR BASE & GUTTER SHALL BE CAST IN MONOLIHIC POUR FROM REAR OF DEVICE TO THE APPROACH TRANSITION WITH CURB & GUTTER.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

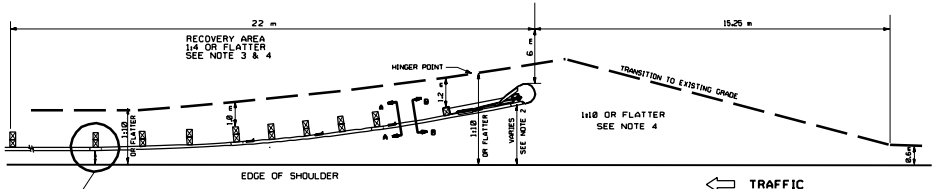
NO.	DATE	APPR.	REMARKS
1	02/01/00	B.A.	CORRECT DIMENSION LOCATION IN SECTION E-E DETAIL. ADD FLOW LINES IN PANORAMIC VIEW FOR A-A, B-B AND CHANGE LABEL FOR E-E IN PANORAMIC VIEW.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — FEB.08,2000 DATE
APPROVED
DEPUTY DIRECTOR — FEB.08,2000 DATE

(METRIC)
ATTENUATOR DRAINAGE DETAILS GUIDELINE "B"
STANDARD DRAWING TITLE

STD. DWG. NO.
735-1J



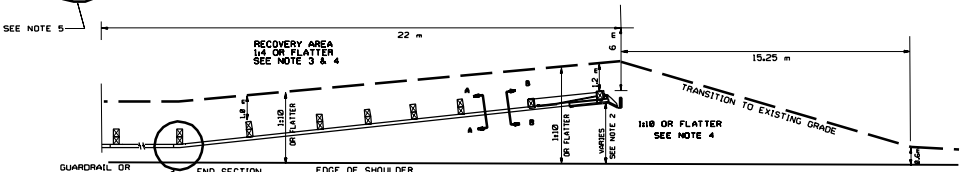
GUARDRAIL OR TRANSITION

END SECTION

VARIES

SEE NOTE 5

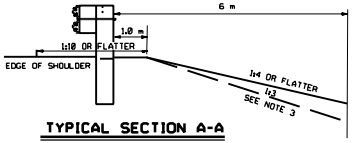
SRT-350
(12.5, 8 POST)
(SEE NOTE 1)



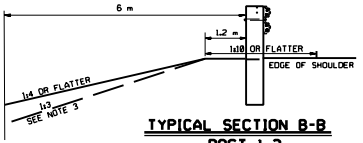
VARIES

SEE NOTE 5

FLEAT - 350
(SEE NOTE 1)



TYPICAL SECTION A-A
POST 3-8



TYPICAL SECTION B-B
POST 1-2

NOTES FOR END SECTION TYPE "H"

1. THE SRT-350 (12.5 , 8), MANUFACTURED BY SYRO INC., OR THE FLEAT-350, MANUFACTURED BY ROAD SYSTEM INC., SHALL BE INSTALLED ACCORDING TO GUIDELINES FOR ATTENUATORS AND END SECTIONS, AND MANUFACTURE'S RECOMMENDATIONS.
2. THE SRT-350 AND THE FLEAT-350 ARE VARIABLE FLARED SYSTEMS. THE SRT-350 INCORPORATES A PARABOLIC TYPE FLARE, WHERE AS THE FLEAT-350 USES A STRAIGHT LINE FLARE. SEE MANUFACTURES SPECIFICATIONS FOR CORRECT POST OFFSET FOR CHOSEN SYSTEM.
3. A 1:4 OR FLATTER FILL SLOPE SHOULD BE USED IN THE RECOVER AREA, BUT IF IMPRACTICAL, A 1:3 SLOPE MAY BE USED. THE RECOVER AREA SHALL BE FREE OF ANY FIXED OBJECTS.
4. GRADING REQUIREMENTS SHALL BE COMPLETED PRIOR TO INSTALATION OF SYSTEM.
5. END SECTION REQUIRES A TRANSITION ELEMENT FOR ATTACHMENT TO BRIDGE PARAPET OR CONCRETE BARRIER. SEE STANDARD DRAWING 735-1F POST PLACEMENT DETAIL.
6. END SECTION SHALL HAVE THE PROPER MARKING INSTALLED, AS PER STANDARD DRAWING 735-1G , END SECTION TYPICAL .

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS NOTED OTHERWISE.

REVISIONS

DATE	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
ENGINEERING STANDARDS COMMITTEE — DEC. 14, 1999 — DATE
APPROVED
DEPUTY DIRECTOR — DEC. 14, 1999 — DATE

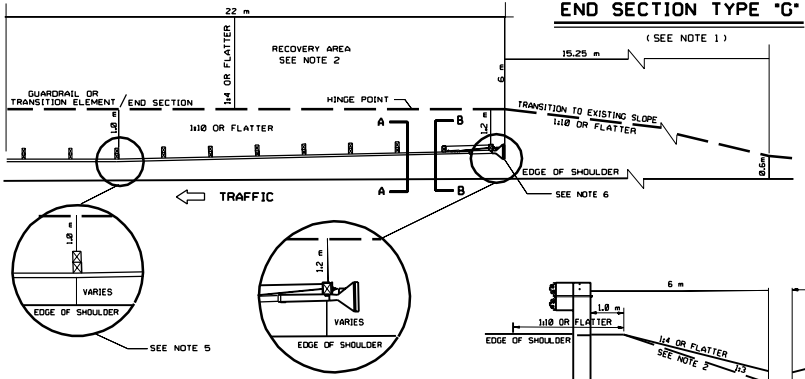
(METRIC)

STANDARD DRAWING TITLE

GRADING DETAIL
END SECTION TYPE "H"

STD. DWG. NO.
735-1K

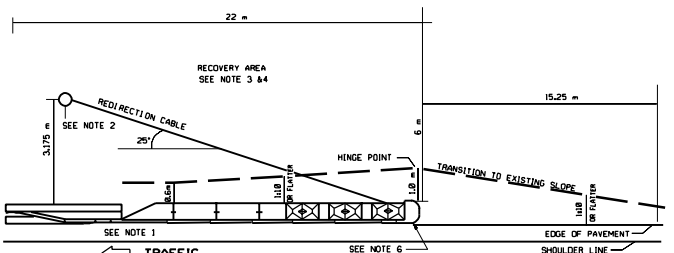
END SECTION TYPE "G"



NOTES FOR END SECTION TYPE "G"

1. AN ET-2000, MANUFACTURED BY SYRO INC., OR AN SKT-350, MANUFACTURED BY ROAD SYSTEMS INC., SHALL BE INSTALLED ACCORDING TO MANUFACTURE'S RECOMMENDATIONS.
2. A 1:4 OR FLATTER FILL SLOPE SHOULD BE USED IN THE RECOVER AREA, BUT IF IMPRACTICAL, A 1:3 SLOPE MAY BE USED. THE RECOVER AREA SHALL BE FREE OF ANY FIXED OBJECTS.
3. GRADING REQUIREMENTS SHALL BE COMPLETED PRIOR TO INSTALLATION OF SYSTEM.
4. END SECTION SHALL BE INSTALLED AT A 1:50 TAPER, STARTING AT ATTACHMENT TO THE GUARDRAIL RUN OR THE TRANSITION ELEMENT, TO ENSURE THAT IMPACT HEAD IS CLEAR OF SHOULDER.
5. END SECTION REQUIRES A TRANSITION ELEMENT FOR ATTACHMENT TO BRIDGE PARAPET OR CONCRETE BARRIER. SEE STANDARD DRAWING 735-1F POST PLACEMENT DETAIL.
6. END SECTION SHALL HAVE THE PROPER MARKING INSTALLED, AS PER STANDARD DRAWING 735-1G END SECTION TYPICALS.

END SECTION TYPE "F"



NOTES FOR END SECTION TYPE "F"

1. A QUADTREND 350 , MANUFACTURED BY ENERGY ABSORPTION, SHALL BE INSTALLED ACCORDING TO MANUFACTURE'S RECOMMENDATIONS. THE QUADTREND 350 IS FOR USE WITH CONCRETE BARRIER OR ON BRIDGE PARAPETS WITH LESS THAN 30 m OF LONGITUDINAL SPACE IN FRONT OF THE HAZARD. THE QUADTREND 350 REQUIRES A CONCRETE PAD.
2. THE CABLE ANCHOR SHALL BE PLACED IN SUCH A MANNER AS TO ALLOW THE REDIRECTING CABLE TO LIE FLAT ON THE GROUND. THE REDIRECTING CABLE SHALL NOT BE BURIED AND SHALL BE FREE OF OBSTACLES.
3. A 1:4 OR FLATTER FILL SLOPE SHOULD BE USED IN THE RECOVER AREA, BUT IF IMPRACTICAL, A 1:3 SLOPE MAY BE USED. THE RECOVER AREA SHALL BE FREE OF ANY FIXED OBJECTS.
4. GRADING REQUIREMENTS SHALL BE COMPLETED PRIOR TO INSTALLATION SYSTEM.
5. A TRANSITION ELEMENT AS RECOMMENDED BY THE MANUFACTURE SHALL BE USED FOR ATTACHMENT TO BRIDGE PARAPET OR CONCRETE BARRIER.
6. END SECTION SHALL HAVE THE PROPER MARKING INSTALLED, AS PER STANDARD DRAWING 735-1G , END SECTION TYPICALS.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

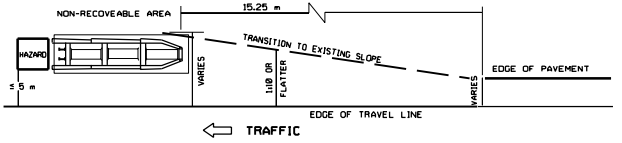
RECOMMENDED FOR APPROVAL — DEC.14.1999 — DATE
STANDARDS COMMITTEE CHAIRMAN
APPROVED — DEC.14.1999 — DATE
DEPUTY DIRECTOR

(METRIC)
STANDARD DRAWING TITLE
GRADING DETAIL
END SECTION
TYPE "G" • TYPE "F"

STD. DWG. NO.
735-1L

SHOULDER APPLICATION

(SEE NOTE 2)



NOTES

1. **ATTENUATOR TYPE A :** QUADGUARD WIDE, MANUFACTURED BY ENERGY ABSORPTION SYSTEM, TO PROTECT HAZARDS 1700 mm to 2286 mm WIDE.

   ATTENUATOR TYPE B : QUADGUARD, MANUFACTURED BY ENERGY ABSORPTION SYSTEMS. TRACC MANUFACTURED BY SYRO, INC. TO PROTECT HAZARDS 610 mm TO 915 mm.

   ATTENUATOR TYPE D : QUADGUARD ELITE, MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, QUADGUARD LMC, MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, REACT-350, MANUFACTURED BY ROADWAY SAFETY SYSTEM.

   TYPE D SYSTEMS WILL PROTECT HAZARDS IN WIDTH RANGING FROM 610 mm TO 2286 mm, SHOULD ONLY BE USED WHERE ONE IMPACT PER YEAR IS ANTICIPATED, OR WHEN REPAIR HISTORY INDICATES TWO OR MORE IMPACTS OVER A THREE YEAR PERIOD.

2. ALL APPLICATIONS REQUIRE THE USE OF SLOPES 1:10 OR FLATTER TO THE FRONT APPROACH, AND THE SIDE APPROACHES. A 1:10 OR FLATTER SLOPE IS ALSO REQUIRED IN THE REAR OF SYSTEM IF YOU HAVE TRAFFIC APPROACHING FROM THE REAR.

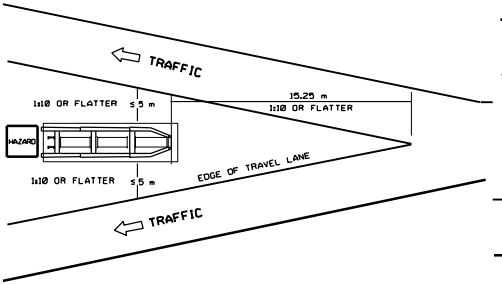
3. ALL SYSTEMS PLACED IN LOCATIONS WHERE TRAFFIC IS APPROACHING THE REAR OF SYSTEM REQUIRES A TRANSITION ELEMENT AS PER MANUFACTURE'S SPECIFICATIONS.

4. SEE MANUFACTURE'S SPECIFICATIONS FOR PAD AND BACKUP REQUIREMENTS.

5. ATTENUATOR SHALL HAVE THE PROPER MARKINGS INSTALLED AS PER STANDARD DRAWING 735-1G.

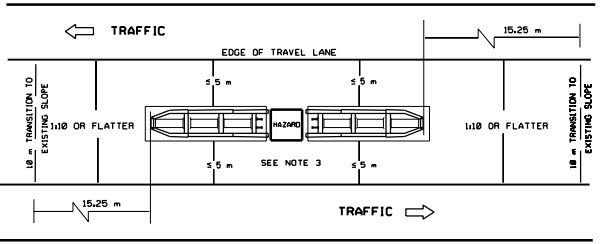
GORE APPLICATION AREA

(SEE NOTE 2)



MEDIAN APPLICATION

(SEE NOTE 2)



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	APPR.	REVISIONS REMARKS
1	BA	08/28/2008 CORRECT SPELLING ERROR

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — FEB.08.2008 DATE
COORDINATOR STANDARDS COMMITTEE
APPROVED — FEBRUARY 2008 DATE
DEPUTY DIRECTOR

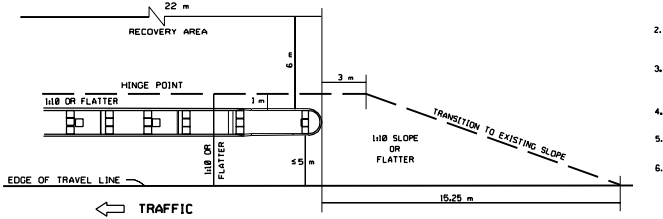
(METRIC)

DETAIL FOR PLACEMENT ATTENUATORS A, B & D

STANDARD DRAWING TITLE

STD. DWG. NO.
735-1M

SHOULDER APPLICATION



NOTES FOR ATTENUATOR TYPES C, PLACEMENT DRAWING

1. THE C.A.T., CRASH CUSHION ATTENUATING TERMINAL, MANUFACTURED BY SYRO, INC. AND THE BRAKEMASTER, MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, SHALL BE INSTALLED ACCORDING TO GUIDELINES FOR ATTENUATORS AND END SECTIONS AND MANUFACTURES SPECIFICATIONS.

   THESE SYSTEMS ARE PRIMARILY USED WITH SINGLE OR DOUBLE FACED GUARDRAIL, TRANSITION ELEMENTS AND ARE AVAILABLE FOR USE WITH CONCRETE BARRIER OR OTHER CONCRETE STRUCTURES. BOTH SYSTEMS ARE IN EXCESS OF 9.5 m IN LENGTH AND REQUIRE A SUBSTANTIAL AMOUNT OF SPACE IN FRONT OF THE HAZARD TO BE PROTECTED.

2. THE C.A.T., REQUIRES A GRADED SURFACE, THE BRAKEMASTER SURFACE SHALL BE A STANDARD FIRM SOIL OR COMPACTED SUBBASE AS A MINIMUM. ALL GRADING REQUIREMENTS SHALL BE COMPLETED PRIOR TO INSTALATION OF THE SYSTEM.

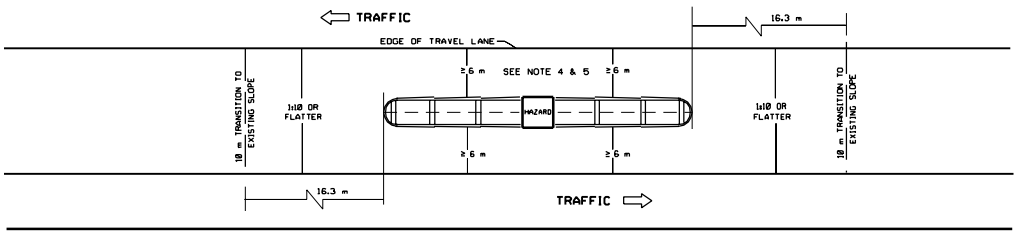
3. ALL APPLICATIONS REQUIRE THE USE OF SLOPES 1:10 OR FLATTER TO THE FRONT APPROACHES. A 1:10 SLOPE OR FLATTER IS REQUIRED IN THE REAR OF THE SYSTEM IF YOU HAVE TRAFFIC APPROACHING FROM THE REAR. ALL APPROACH AREAS SHALL BE FREE OF ANY OBSTRUCTIONS.

4. WHEN PLACED IN A MEDIAN APPLICATION, A RECOVERY AREA OF 22 m x 6 m IS REQUIRED FOR BOTH DIRECTIONS OF TRAVEL.

5. SYSTEMS PLACED IN LOCATIONS WHERE TRAFFIC IS APPROACHING THE REAR SYSTEM REQUIRES A TRANSITION ELEMENT, AS PER MANUFACTURE'S SPECIFICATIONS.

6. ATTENUATOR SHALL HAVE THE PROPER MARKINGS INSTALLED AS PER STANDARD DRAWING 735-1G.

MEDIAN APPLICATION



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	APPR.	REVISIONS REMARKS
1	BK	02/28/08 CORRECT SPELLING ERROR

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
COORDINATION STANDARDS COMMITTEE — DATE: FEB.06.2008
APPROVED
DEPUTY DIRECTOR — DATE: FEB.08.2008

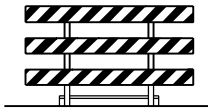
(METRIC)

STANDARD DRAWING TITLE
GRADING & PLACEMENT DETAIL
ATTENUATOR TYPE "C"

STD. DWG. NO.
735-1N

TYPE I

TYPE II



TYPE III

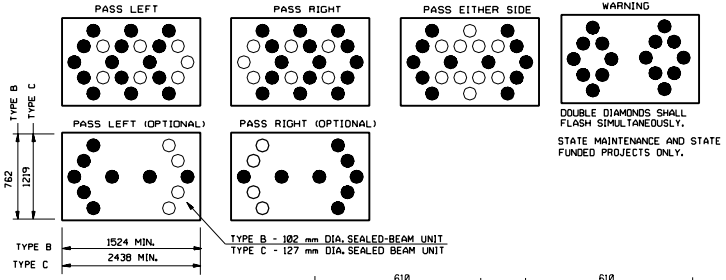
BARRICADES

SEE NOTE 4

M4-10L or R

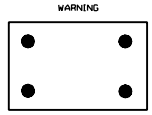
R11-2

ADVANCE WARNING ARROW PANELS

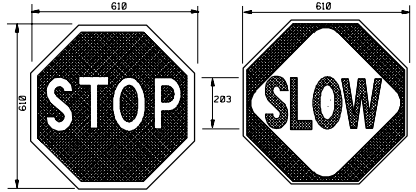


DOUBLE DIAMONDS SHALL FLASH SIMULTANEOUSLY.

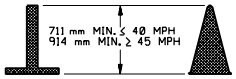
STATE MAINTENANCE AND STATE FUNDED PROJECTS ONLY.



FEDERALLY FUNDED PROJECTS ONLY.



FLAGGER STOP/ SLOW PADDLE



TUBULAR MARKERS

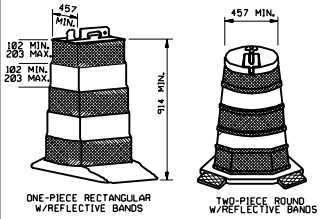
DAYLIGHT HOURS ONLY
SEE NOTE 5

CONES

DAYLIGHT HOURS ONLY
SEE NOTE 5

NOTES

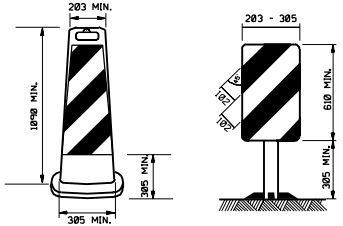
1. ALL CONSTRUCTION SIGNING AND CHANNELIZATION DEVICES USED ON THE STATE HIGHWAY SYSTEM SHALL MEET CURRENT UDOT AND MUTCD STANDARDS.
2. ALL CONSTRUCTION SIGNING AND CHANNELIZATION DEVICES USED ON THE STATE HIGHWAY SYSTEM SHALL MEET NCHRP-350 CRASH TESTING REQUIREMENTS AFTER APRIL 1, 2002. CATEGORY 1 DEVICES, AS DEFINED BY FHWA, MUST BE CERTIFIED BY THE MANUFACTURER AS MEETING MEETING NCHRP-350 REQUIREMENTS. THIS NOTE DOES NOT APPLY TO ADVANCED WARNING ARROW PANELS OR TO VARIABLE MESSAGE SIGNS.
3. THE BOTTOM EDGE OF THE ADVANCE WARNING ARROW PANEL SHALL BE AT LEAST 2134 mm ABOVE THE ROADWAY SURFACE.
4. BARRICADES AND VERTICAL PANELS USED ON INTERSTATE AND ROADWAYS WITH SPEED POSTED GREATER THAN 45 MPH SHALL HAVE A MINIMUM OF 0.174 METERS SQUARED OF REFLECTIVE AREA FACING TRAFFIC AND THE REFLECTIVE AREA SHALL BE A MINIMUM 305 mm ABOVE THE ROADWAY.
5. CONES AND TUBULAR MARKERS SHALL BE CONSTRUCTION ORANGE AND USED ONLY DURING DAYLIGHT HOURS.
6. TYPE III BARRICADES SHALL BE USED FOR A ROAD CLOSURE. TYPE III BARRICADES SHALL EXTEND ACROSS THE ROAD BEING CLOSED A MINIMUM OF ¾ ROAD WIDTH, STARTING FROM THE CENTER AND EXTENDING IN BOTH DIRECTIONS TOWARDS THE SHOULDERS. A "ROAD CLOSED" SIGN (R11-2) SHALL BE PLACED OVER THE CENTER LINE AND "DETOUR" ARROW SIGNS (M4-10L OR R) SHALL BE PLACED ON BOTH SIDES OF THE "ROAD CLOSED" SIGN IF REQUIRED. DETOUR ARROW NOT REQUIRED IF DETOUR IS NOT AT CLOSURE.
7. BALLAST SHALL NOT BE PLACED HIGHER THAN 305 mm ABOVE THE GROUND OR PLACED OVER ANY REFLECTIVE FACE OR RAIL.
8. 305 mm MINIMUM MOUNTING HIEGHT FOR SIGNS MOUNTED ON TEMPORARY SUPPORTS.
9. FOR SIGNS PLACED AMONG CHANNELIZING DEVICES, MOUNTING HEIGHT SHALL BE A MINIMUM OF 1 m OR HIGHER TO PROVIDE SIGN VISIBILITY.
10. FLAGGER STOP/SLOW PADDLE SHALL BE A MINIMUM OF 610 mm x 610 mm.
11. PORTABLE SIGN SHALL HAVE TWO ORANGE STRIPS OF REFLECTIVE SHEETING, 102 mm x 610 mm, PLACED VERTICALLY ON BACK OF SIGN, 306 mm FROM EDGE OF LEFT AND RIGHT CORNERS. THE SHEETING SHALL BE OF THE SAME COLOR AND GRADE AS USED ON THE FRONT OF SIGN.



ONE-PIECE RECTANGULAR W/REFLECTIVE BANDS

TWO-PIECE ROUND W/REFLECTIVE BANDS

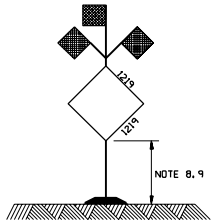
PLASTIC DRUMS



VERTICAL PANELS

SEE NOTE 4

3 ORANGE OR FLUORESCENT RED-ORANGE FLAGS 406 x 406 MIN.



TYP. SIGN INSTALLATION WITH FLAGS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	06/16/99	G.S.	MADE LETTER SIZE IN FLAGGER PADDLE THE SAME
2	05/31/00	G.S.	ADDED NOTE NUMBER 1, RENUMBERED ALL OTHER NOTES AND
			REVISED NOTES UNDER ADVANCE WARNING ARROW PANELS.
3	11/01/00	G.S.	REVISED NOTES, ADDED VERTICAL PANEL AND REVISED
			BARRICADES AND SIGNS.
4	04/02/01	GFS	REVISED NOTE 2, CORRECTED SPELLING NOTE 6
5	06/29/01	GFS	CORRECTED DIMENSION ON VERTICAL PANEL DETAIL AND
			REMOVED ALTERNATING DIAMONDS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: SEP.11,2001 DATE
CHAIRMAN, STANDARDS COMMITTEE

APPROVED: SEP.11,2001 DATE
DEPUTY DIRECTOR

(METRIC)

CONSTRUCTION SIGNING CHANNELIZATION DEVICES

STANDARD DRAWING TITLE

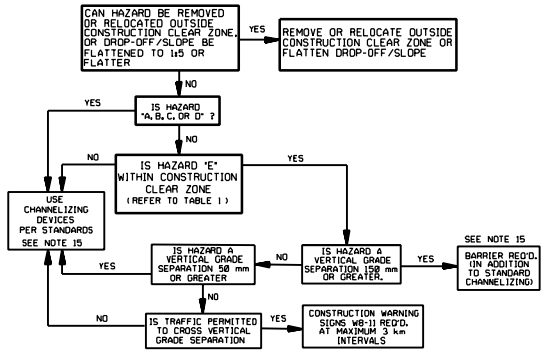
STD. DWG. NO.
745-1

HAZARD MITIGATION

1. USE CONSTRUCTION CLEAR ZONE DISTANCE IDENTIFIED IN TABLE 1 WITH DETAIL "AA" TO MITIGATE THE FOLLOWING HAZARDS:
   - A. NON-WORKING EQUIPMENT
   - B. STOCKPILED MATERIAL
   - C. VEHICLES AND WORKERS (NON-FLAGGERS)
   - D. OTHER OBJECTS & CONSTRUCTION FEATURES
   - E. VERTICAL DROP-OFF LESS THAN 1200 mm OR SLOPES STEEPER THAN 1:4
2. MITIGATE ALL OTHER HAZARDS OR DROP-OFFS GREATER THAN 1200 mm WITHIN AASHTO CLEAR ZONE AS APPROVED BY THE REGION TRAFFIC ENGINEER.

TABLE 1
CONSTRUCTION CLEAR ZONE

40 MPH & LESS	1.0 m
45 MPH	1.8 m
50 MPH	2.0 m
55 MPH	2.2 m
60 MPH	2.4 m
65 MPH	2.6 m
70 MPH	2.8 m
75 MPH	3.2 m



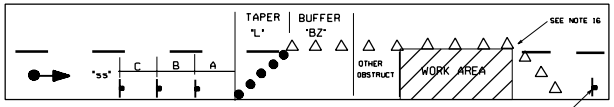
DETAIL "AA"

GENERAL NOTES

1. USE CURRENT EDITION OF UDOT STANDARDS AND MUTCD FOR TRAFFIC CONTROL.
2. USE A MINIMUM 1219 mm x 1219 mm SIZE FOR ALL CONSTRUCTION WARNING SIGNS. USE NCHRP-350 APPROVED SIGN SUPPORTS FOR ALL FIXED CONSTRUCTION SIGNS AND INSTALL ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
3. SEE STANDARD DRAWING 745-1, CONSTRUCTION SIGNING AND CHANNELIZATION DEVICES, FOR CONSTRUCTION ZONE DEVICE REQUIREMENTS.
4. COVER OR REMOVE NON-APPLICABLE SIGNING, BOTH EXISTING AND CONSTRUCTION SIGNS. REMOVE NON-APPLICABLE PAVEMENT MARKINGS.
5. REMOVE NON-APPLICABLE PORTABLE SIGNS OR MOVE BEYOND A DISTANCE TWICE THAT OF THE CONSTRUCTION CLEAR ZONE. (SEE TABLE 1 DETAIL AA)
6. DO NOT USE FLAGGERS AT OPERATING TRAFFIC SIGNALS. UNIFORMED POLICE OFFICERS MUST BE USED AT OPERATING TRAFFIC SIGNALS.
7. USE A FULL LANE CLOSURE WHEN WORK ENCROACHES INTO A TRAFFIC LANE, UNLESS THE TRAFFIC LANE IS RECREATED.
8. CLEAN OR RESTORE PAVEMENT MARKINGS AT THE END OF EACH DAYS OPERATION, BOTH ON AND OFF THE PROJECT THAT ARE OBSCURED BY WORK OPERATIONS.
9. LIMIT ADVISORY AND REGULATORY SPEED REDUCTIONS TO 10 MPH, WITH THE APPROVAL FROM THE RESIDENT ENGINEER. USE SPEED REDUCTIONS ONLY DURING IMPACTED TIMES AND IN IMPACTED AREAS. FOR REDUCTIONS EXCEEDING 10 MPH, OBTAIN APPROVAL FROM THE REGION TRAFFIC ENGINEER. RESTORE REGULATORY SPEED LIMIT AT LOCATIONS WHERE TRAFFIC IS NOT BEING IMPACTED BY CONSTRUCTION ACTIVITIES.
10. USE A MINIMUM 900 mm x 1200 mm SIZE FOR TEMPORARY REGULATORY SPEED SIGNS. A MINIMUM 600 mm x 600 mm SIZE ADVISORY SPEED PLATES MAY BE USED IN CONJUNCTION WITH OTHER CONSTRUCTION WARNING SIGNS.
11. USE THE POSTED SPEED LIMIT PRIOR TO CONSTRUCTION TO COMPUTE THE SIGN SPACING, TAPER LENGTH, BUFFER ZONE, AND CONSTRUCTION CLEAR ZONE DISTANCE. USE THE POSTED SPEED LIMIT DURING CONSTRUCTION TO DETERMINE THE TANGENT SPACING FOR CHANNELIZING DEVICES.
12. USE PLASTIC DRUMS FOR LANE CLOSURE TAPER DEVICES FOR 50 MPH AND GREATER.
13. USE DOWNSTREAM TAPER FOR OPERATIONS LONGER THAN 3 DAYS.
14. PLACE ADVANCE WARNING ARROW PANEL BETWEEN THE BEGINNING OF THE TAPER AND 1/3 L OF THE TAPER.
15. USE AN APPROVED CONSTRUCTION ZONE ATTENUATOR WITH TEMPORARY PRECAST BARRIER WHEN APPROACH ENDS ARE WITHIN AASHTO CLEAR ZONE. DO NOT USE A TRUCK MOUNTED ATTENUATOR FOR ANY PERIOD LONGER THAN 24 HOURS.

TAPER, BUFFER ZONE & SIGN SPACING CHART

	POSTED SPEED MPH "S"	MINIMUM TAPER LENGTH "L" 3.6 m LANE CLOSURE	LENGTH OF BUFFER "BZ" DESIRABLE	MINIMUM SIGN SPACING "SS" A	B	C	ONE LANE TWO-WAY FLAGGING TAPER LENGTH
NON INTER STATE	30 AND LOWER	55	30	61	61	61	15
	35	75	36	107	107	107	
	40	98	51				
	45	165	67				30
	50	183	85				
	55	202	102	153	153	153	
	60	220	126				
	65	238	148				
INTER STATE	65	238	148				
	70	256	183	305	488	792	
	75	275	213				



EXAMPLE- NOT TO SCALE

1- TAPER FORMULAS

a) LANE TAPER LENGTH IN METERS

L= SW ≥ (45 MPH) L= $\frac{WS^2}{60}$ ≤ (40 MPH)

1/3L = FOR SHOULDER CLOSURE TAPER

1/2L = FOR LANE SHIFT TAPER

WHERE L = TAPER LENGTH IN (METERS)
W = WIDTH OF CLOSURE OR SHIFT IN (METERS)
"S" = POSTED SPEED IN MILES PER HOUR.

2- CHANNELIZING DEVICES

a) LANE TAPER SHALL CONSIST OF A MINIMUM OF 1 DEVICE PER 0.3 m OF LANE CLOSED WITH 1 ADDITIONAL DEVICE TO START TAPER.

b) ON TANGENT: "S" x 0.6 = SPACING (METERS) UP TO 30 m MAXIMUM.

c) LENGTH OF BUFFER ZONE (BZ) IS THE DISTANCE FROM END OF LANE CLOSURE TAPER TO WORK AREA, OR ANY OBSTRUCTION PRIOR TO WORK AREA.

TRAFFIC CONTROL DEVICE LEGEND

- SIGN (PORTABLE OR FIXED)
- CHANNELIZING DEVICE (SEE STANDARD DRAWING 745-1)
- PLASTIC DRUMS
- FLAGGING STATION
- ADVANCE WARNING ARROW PANEL
- BARRIER
- DIRECTION OF TRAFFIC
- TYPE III BARRICADE
- DIRECTION OF WORK VEHICLE

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

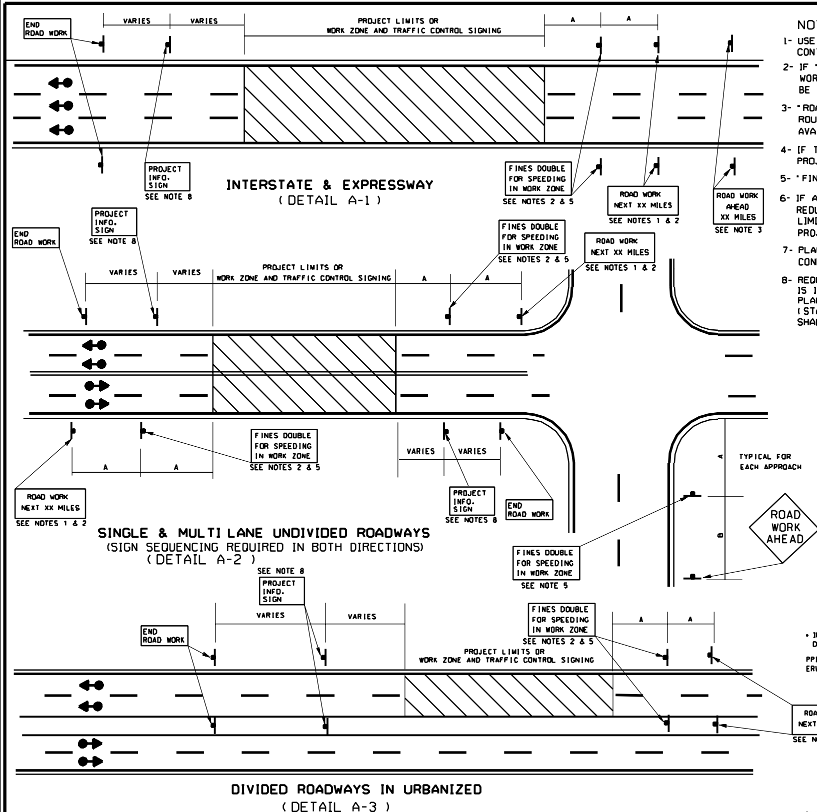
NO.	DATE	APPR.	REMARKS
1	10/27/00	GFS	REVISED DETAIL AA, TAPER, BUFFER ZONE, & SIGN SPACING CHART AND GENERAL NOTES.
2	03/29/01	GFS	REVISED DETAIL "AA"

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10, 2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.10, 2001 DATE
DEPUTY DIRECTOR

(METRIC)
STANDARD DRAWING TITLE
TRAFFIC CONTROL GENERAL

STD. DWG. NO.
745-2



NOTES:

1- USE " ROAD WORK NEXT __ MILES " SIGN, G20-1, IF TRAFFIC CONTROL IS GREATER THAN 3.2 km IN LENGTH.

2- IF " ROAD WORK NEXT __ MILES " IS NOT USED, THE ROAD WORK AHEAD SIGN OF THE TRAFFIC CONTROL SIGNING SHALL BE PLACED AHEAD OF THE FINES DOUBLE FOR SPEEDING SIGN.

3- " ROAD WORK AHEAD __ MILES " SIGN SHOULD BE PLACED AT ROUTE SEPARATION POINT, IF AN ALTERNATE ROUTE IS AVAILABLE AND EXPECTED DELAYS WILL BE SIGNIFICANT.

4- IF TRAFFIC CONTROL AFFECTS TRAFFIC IN BOTH DIRECTIONS PROJECT LIMIT SIGNING IS REQUIRED FOR BOTH DIRECTIONS.

5- " FINES DOUBLE FOR SPEEDING IN WORK ZONE " IS OPTIONAL.

6- IF AN INTERCHANGE IS WITHIN PROJECT LIMITS AND SPEED REDUCTION IS USED, FINES DOUBLE SIGNING AND SPEED LIMIT SIGNING MUST BE PLACED SO THOSE ENTERING THE PROJECT ARE AWARE OF RESTRICTION.

7- PLACE SIGNING ON RIGHT SHOULDER AND MEDIAN IF CONDITIONS PERMIT.

8- REQUIRED ONLY IF STANDARD SPECIFICATION 01315 IS INCLUDED IN PROJECT SPECIFICATIONS. PLACEMENT OF PROJECT PUBLIC INFORMATION SIGN (STANDARD DRAWING 745-52) AND END ROAD WORK SIGN SHALL BE MEASURED FROM THE END OF DOWNSTREAM TAPER.

DIVIDED & UNDIVIDED ROADWAY			
SPEED	PPIS	ERW	*ERW
30 OR LESS	30 m	30 m	50 m
35-45 MPH	50 m	50 m	60 m
≥ 50 MPH	100 m	100 m	100 m

* IF THE PROJECT PUBLIC INFORMATION SIGN IS NOT USED, USE THE SPECIFIED DISTANCE IN THIS COLUMN FOR PLACEMENT OF END ROAD WORK SIGN.

PPIS: PROJECT PUBLIC INFORMATION SERVICES SIGN (STANDARD DRAWING 745-52)
ERW: END ROAD WORK

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

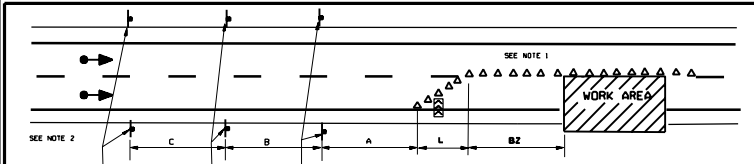
NO.	DATE	APPR.	REMARKS
1	10/27/00	GFS	REVISED NOTE 5 AND CHANGED DIRECTION OF TRAVEL ARROW TO MATCH 745-2 LEGEND, DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — NOV.14,2000 DATE
APPROVED — DEPUTY DIRECTOR — NOV.14,2000 DATE

(METRIC)
TRAFFIC CONTROL
PROJECT LIMIT SIGNING
STANDARD DRAWING TITLE

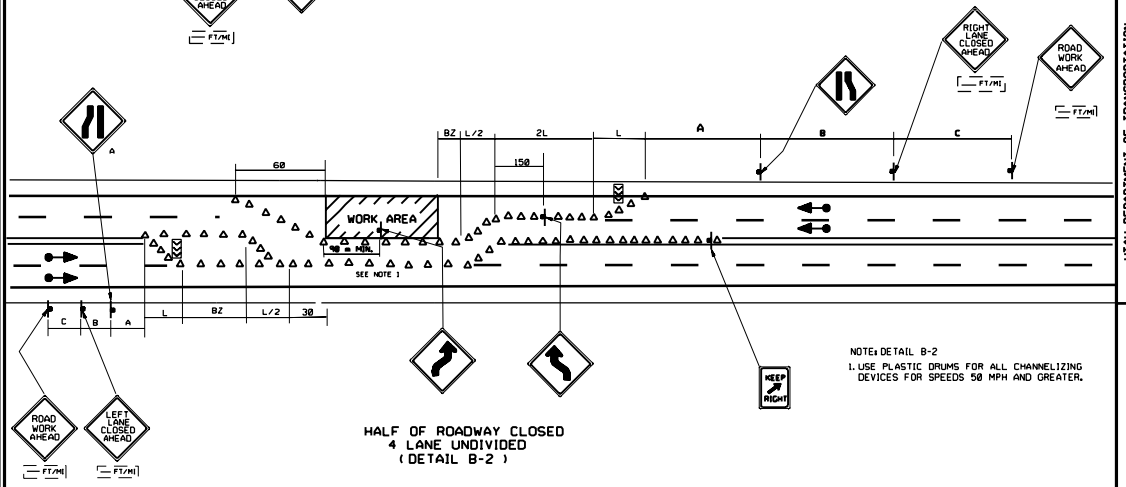
STD. DWG. NO.
745-2A



TYPICAL LANE CLOSURE MULTILANE
(2 OR MORE LANES EACH DIRECTION)
(DETAIL B-1)

NOTE: DETAIL B-1

1. USE PLASTIC DRUMS FOR ALL CHANNELIZING DEVICES FOR SPEEDS 50 MPH AND GREATER.
2. PLACE SIGNS IN MEDIAN/LT. SHOULDER IF CONDITIONS PERMIT.



HALF OF ROADWAY CLOSED
4 LANE UNDIVIDED
(DETAIL B-2)

NOTE: DETAIL B-2

1. USE PLASTIC DRUMS FOR ALL CHANNELIZING DEVICES FOR SPEEDS 50 MPH AND GREATER.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS			
1	08/27/2008	GFS	CHANGE CHANNELIZATION DEVICE REQUIREMENTS ON DETAIL B-2 DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL:

CHAIRMAN, STANDARDS COMMITTEE — DATE: NOV. 14, 2008

APPROVED:

DEPUTY DIRECTOR — DATE: NOV. 14, 2008

(METRIC)

TRAFFIC CONTROL LANE CLOSURE

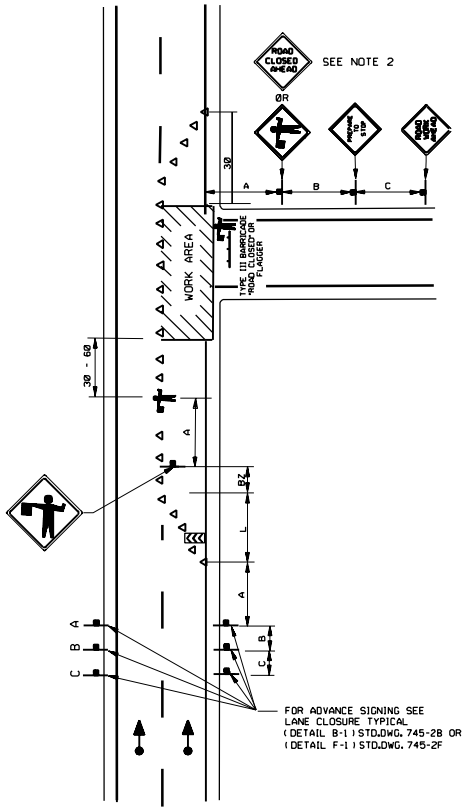
STANDARD DRAWING TITLE

STD. DWG. NO.

745-28

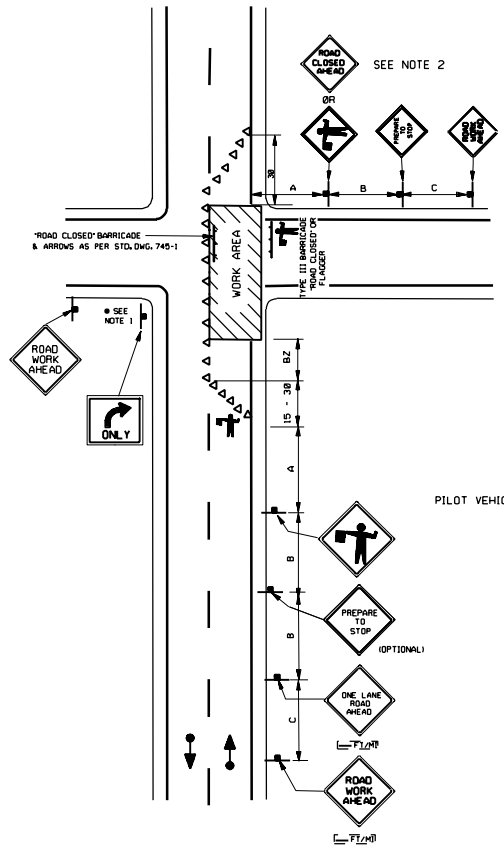
NOTES: DETAIL C-1 AND C-2

1. FLAGGING & SYMBOL SIGN MUST BE PROVIDED IF TURNING TRAFFIC CONFLICTS WITH ONE WAY TRAFFIC.
2. IF ROAD CLOSURE EXCEEDS 24 HOURS A DETOUR, AS PER UDOT AND MUTCD STANDARDS MUST BE PROVIDED.



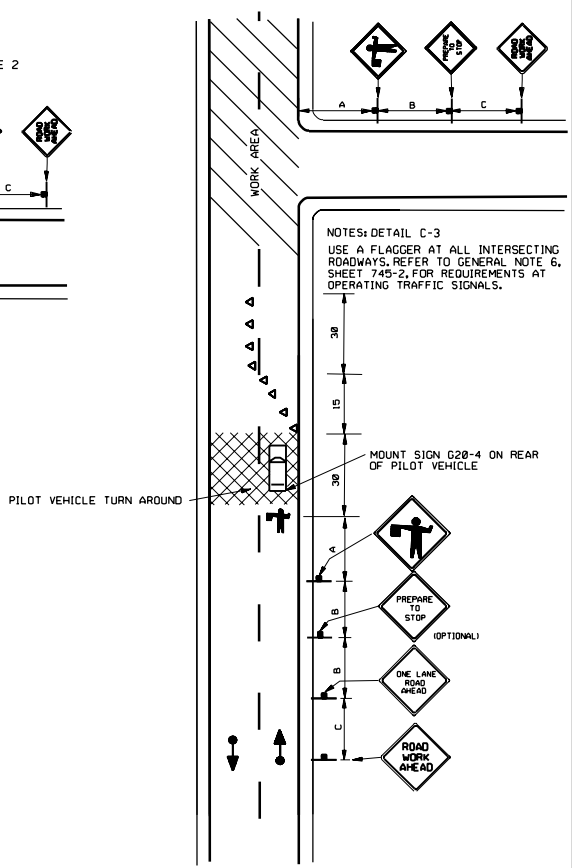
FLAGGING OPERATION - ONE WAY WITH POTENTIAL ENCROACHMENT BY WORK VEHICLE (DETAIL C-1)

SAME SIGN SEQUENCE, SPACING, & FLAGGER REQUIRED FOR OPPOSITE DIRECTION OF TRAFFIC.



FLAGGING OPERATION - TWO WAY WITH ONE LANE CLOSED (DETAIL C-2)

SAME SIGN SEQUENCE, SPACING, & FLAGGER REQUIRED FOR OPPOSITE DIRECTION OF TRAFFIC.



FLAGGING OPERATIONS WITH USE OF PILOT VEHICLE (DETAIL C-3)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR	REMARKS
1	11/26/00	GFS	DETAIL NUMBERS CHANGED.
2	04/02/01	GFS	REVISED NOTE DETAIL C-3

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.10.2001 DATE
DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE

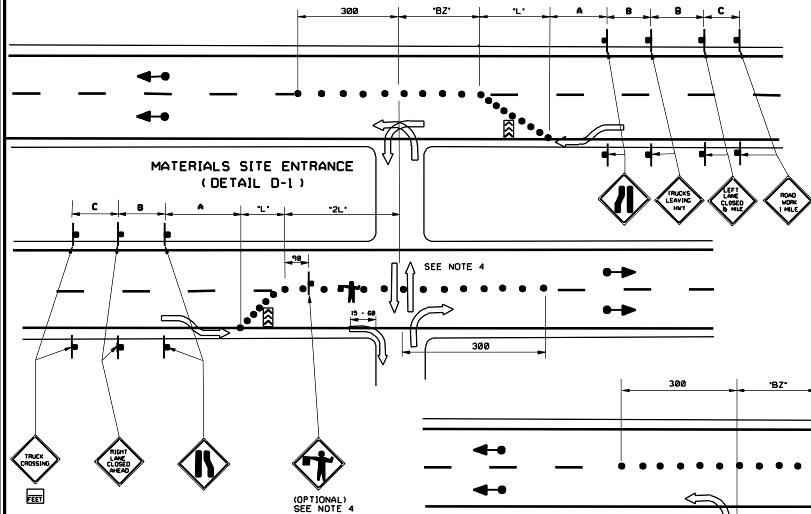
TRAFFIC CONTROL FLAGGING OPERATION

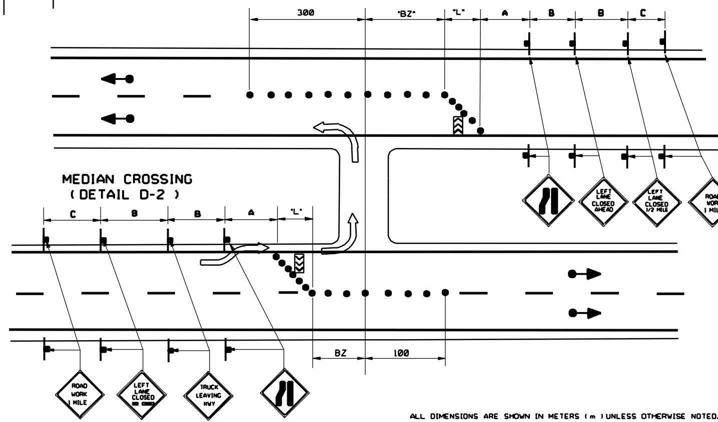
STD. DWG. NO.

745-2C

NOTES: DETAILS D-1 AND D-2

1. SPACING BETWEEN TEMPORARY MEDIAN CROSSOVERS/TURN-AROUND SHALL BE 5 km OR GREATER.
2. DO NOT USE A CROSSOVER/TURN AROUND IF AN INTERCHANGE IS WITHIN 6.4 km OF THE PROJECT.
3. ANY EXCEPTION TO NOTE 2, MUST BE APPROVED BY REGION TRAFFIC ENGINEER.
4. CROSSING TRAFFIC HAS THE RESPONSIBILITY TO STOP OR YIELD TO THROUGH TRAFFIC. IF SIGHT DISTANCE IS INADEQUATE FOR CROSS TRAFFIC TO PROCEED SAFELY, A FLAGGER MAY BE USED.





ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

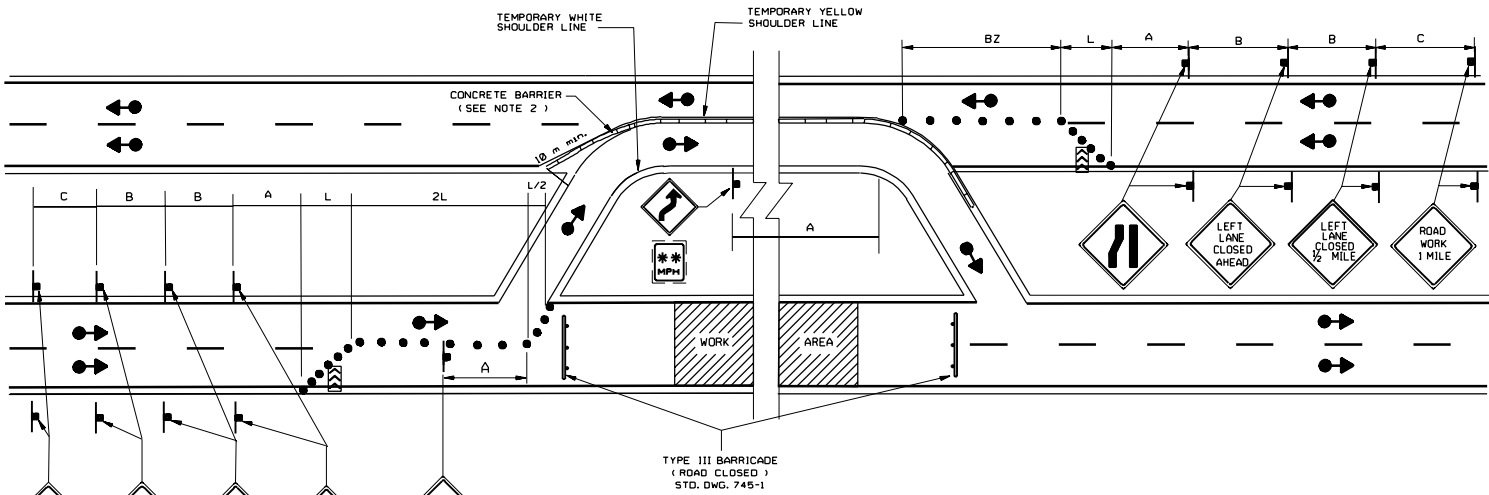
REVISIONS			
1	10/27/00	GFS	DETAIL D-1: CHANGE SIGN TO TRUCK CROSSING, MADE FLAGGING OPTIONAL, ADDED NOTE 4. DETAIL NUMBERS CHANGED.
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE APPROVED — NOV.14,2000 DATE
DEPUTY DIRECTOR — NOV.14,2000 DATE

(METRIC)
TRAFFIC CONTROL
EXPRESSWAY AND FREEWAY
CROSSOVER/TURN AROUND
STANDARD DRAWING TITLE

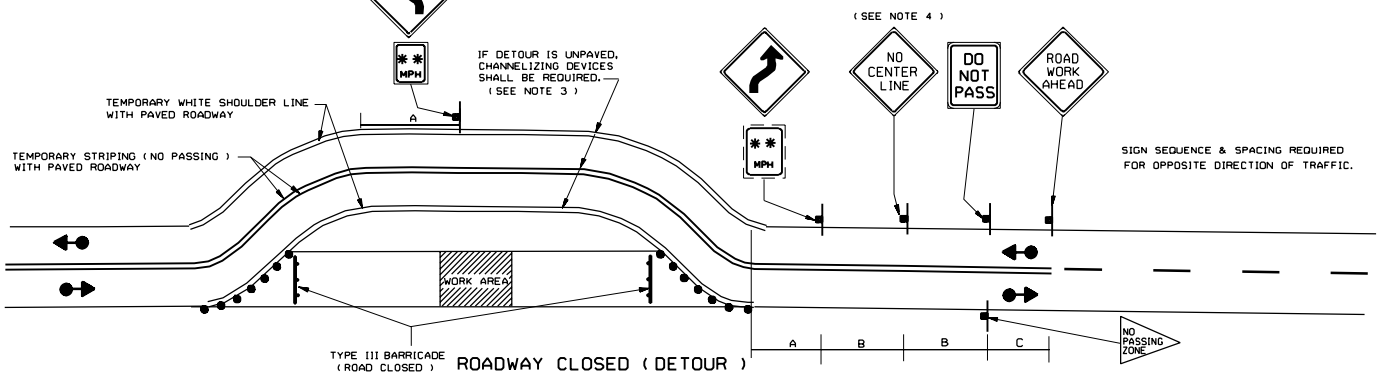
STD. DWG. NO.
745-20



ONE ROADWAY CLOSED 4 LANE DIVIDED (DETAIL E-1)

NOTES: DETAILS E-1 AND E-2

1. ROAD CLOSED BARRICADES, STRIPES AND DETOUR ARROW TO BE PROPERLY ORIENTED FOR APPROACHING TRAFFIC.
2. BARRIER LAYOUT TO BE IN ACCORDANCE WITH AASHTO ROADSIDE DESIGN GUIDE (CURRENT EDITION). SEE NOTE 15 SHEET 745-2
3. WHEN GRADING IS REQUIRED THE ENGINEER HAS THE OPTION OF ELIMINATING EITHER THE CENTER LINE CHANNELIZATION OR SHOULDER CHANNELIZATION.
4. PLACE A WARNING SIGN AS SHOWN IN DETAIL E-2 IF CENTER LINE CHANNELIZATION IS ELIMINATED.



ROADWAY CLOSED (DETOUR) 2 LANE, 2 WAY TRAFFIC (DETAIL E-2)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	11/29/99	G.S.	REVISED NOTE 4 ADDED NOTE 3 AND ADDED SIGN IN DETAIL E-2
2	03/20/08	DFS	REVISED NOTE 3, ADDED NOTE 4, CHANGED TRAFFIC DIRECTION TO MATCH 745-2 LEGEND, DETAIL NUMBERS CHANGED.
3	04/02/01	DFS	REVISED NOTE 2

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — APR.10.2001 DATE
APPROVED
DEPUTY DIRECTOR — APR.10.2001 DATE

(METRIC)

TRAFFIC CONTROL ROAD CLOSED, DETOUR

STANDARD DRAWING TITLE

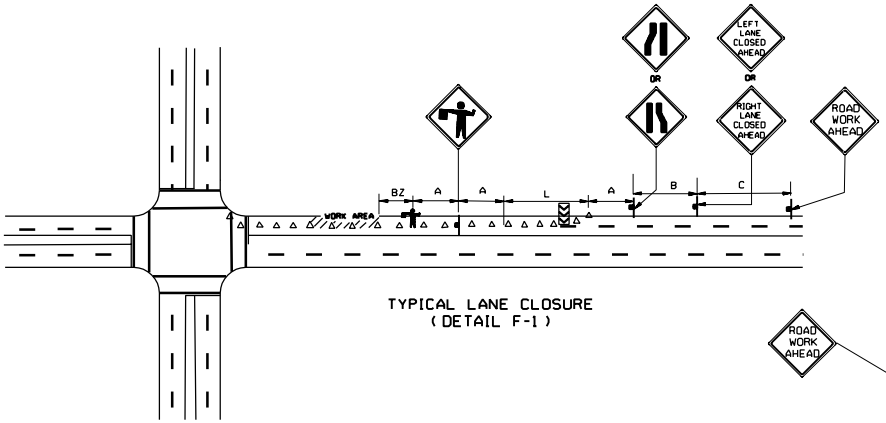
STD. DWG. NO.
745-2E

NOTES:

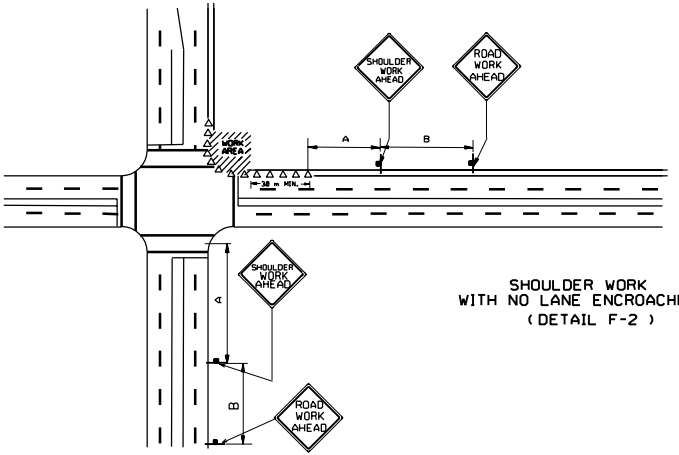
1- FLAGGING MAY BE PROVIDED IN CONJUNCTION WITH LANE CLOSURE AS SHOWN. IF FLAGGING IS USED, A "FLAGGER AHEAD" SYMBOL SIGN MUST BE INSTALLED.

2- IF PEDESTRIAN TRAFFIC CANNOT BE MAINTAINED ON EXISTING CROSSWALKS AND SIDEWALKS, PEDESTRIANS MUST BE REROUTED TO DESIRED PATH ACCORDING TO STANDARD DRAWING 745-2K.

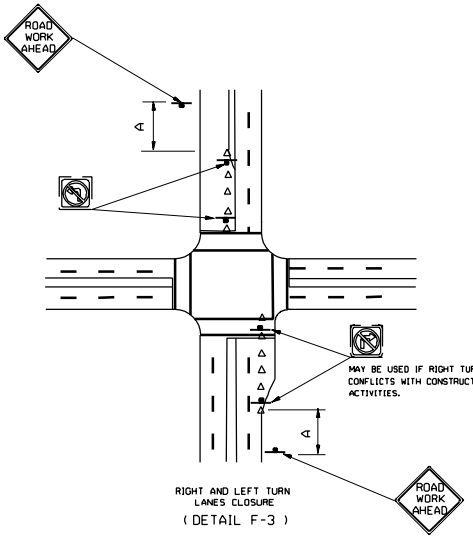
3- MINIMUM OF A 3 m WIDE LANE EACH DIRECTION MUST BE PROVIDED OR FLAGGING AS FOR A ONE LANE OPERATION IS REQUIRED.



TYPICAL LANE CLOSURE
(DETAIL F-1)



SHOULDER WORK
WITH NO LANE ENCROACHMENT
(DETAIL F-2)



RIGHT AND LEFT TURN
LANES CLOSURE
(DETAIL F-3)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

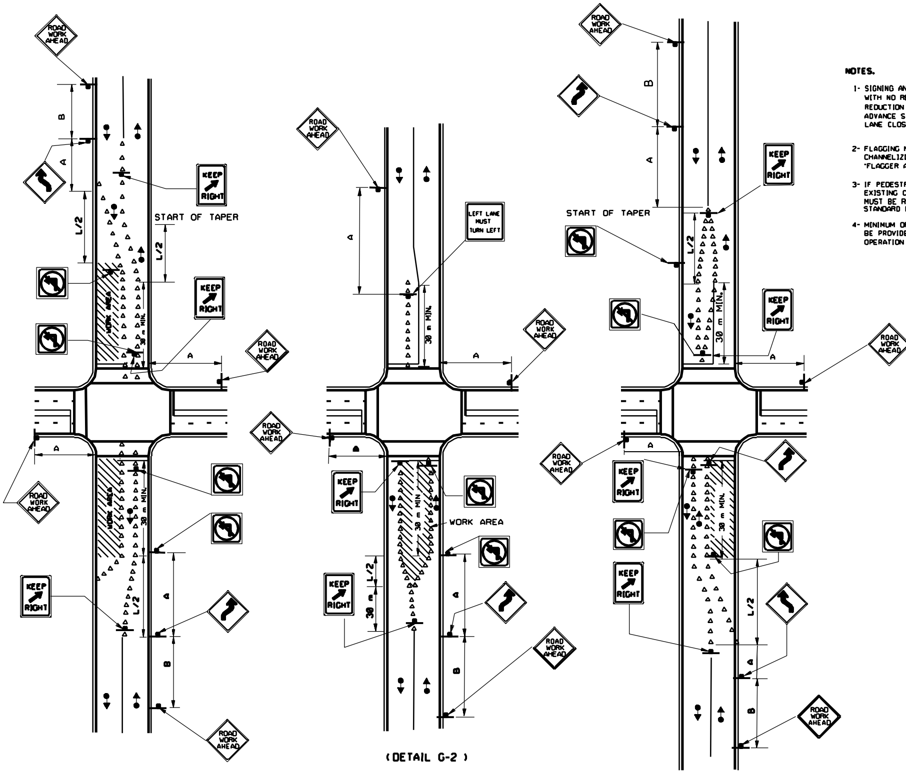
REVISIONS				
NO.	DATE	APPR.	REMARKS	
1	1/26/00	GFS	DETAIL NUMBERS CHANGED.	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — NOV.14.2000 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — NOV.14.2000 DATE
DEPUTY DIRECTOR

(METRIC)
TRAFFIC CONTROL
URBAN INTERSECTION WITH ROADWAYS UNDER 50 MPH
STANDARD DRAWING TITLE

STD. DWG. NO.
745-2F



(DETAIL G-1) (DETAIL G-2) (DETAIL G-3)

LANE SHIFT FOR URBAN INTERSECTIONS

NOTES.

1- SIGNING AND DEVICES SHOWN FOR 2 LANE ROADWAY WITH NO REDUCTION IN NUMBER OF LANES. FOR LANE REDUCTION ON 4 LANES OR GREATER SUBSTITUTE ADVANCE SIGNING AND DEVICES AS PER TYPICAL LANE CLOSURE. SEE 745-2B OR 745-2F

2- FLAGGING MAY BE PROVIDED IN CONJUNCTION WITH CHANNELIZING DEVICES SHOWN. IF FLAGGING IS USED, A "FLAGGER AHEAD" SYMBOL SIGN MUST BE INSTALLED.

3- IF PEDESTRIAN TRAFFIC CANNOT BE MAINTAINED ON EXISTING CROSSWALKS AND SIDEWALKS, PEDESTRIANS MUST BE ROUTED TO DESIRED PATHS, ACCORDING TO STANDARD DRAWING 745-2K.

4- MINIMUM OF A 3 m WIDE LANE EACH DIRECTION MUST BE PROVIDED OR FLAGGING AS FOR A ONE LANE OPERATION IS REQUIRED.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10/30/00	GFS	DETAIL G-2, CHANGED APPROACH AND EXIT TAPER REQUIREMENTS
			DETAIL G-3, CHANGED LANE SHIFT ARROW SYMBOL
			DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — NOV.14,2000 DATE

APPROVED

DEPUTY DIRECTOR — NOV.14,2000 DATE

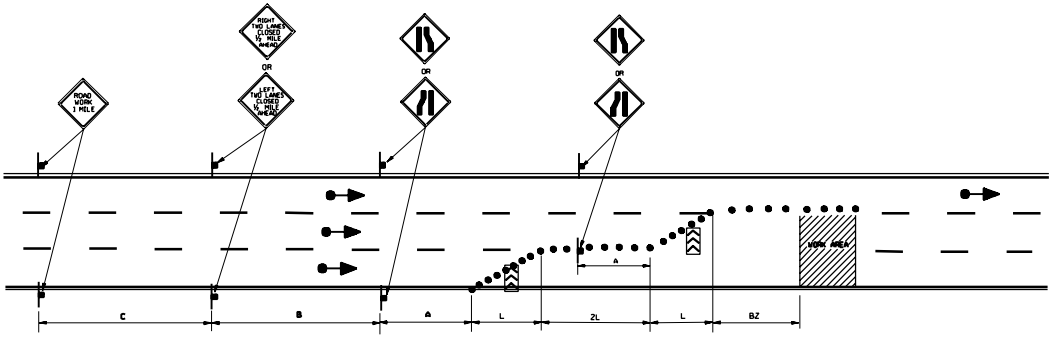
(METRIC)

TRAFFIC CONTROL URBAN INTERSECTION WITH ROADWAYS UNDER 50 MPH

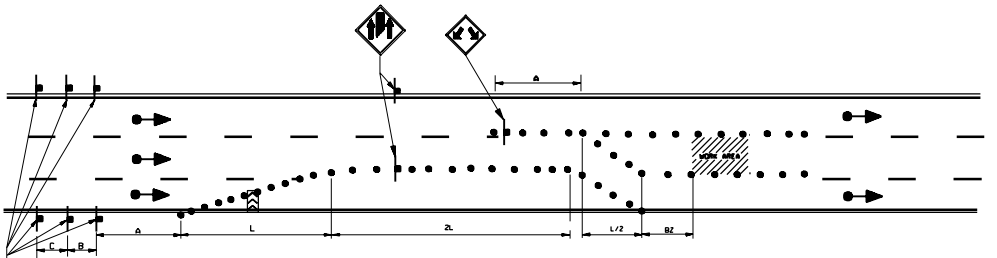
STANDARD DRAWING TITLE

STD. DWG. NO.

745-2G



TWO LANES CLOSURE
(DETAIL H-1)



FOR ADVANCE SIGNING SEE
LANE CLOSURE TYPICAL
(DETAIL B-1) STD. DWG. 745-2B
OR (DETAIL F-1) STD. DWG. 745-2F

CENTER LANE CLOSURE
(DETAIL H-2)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

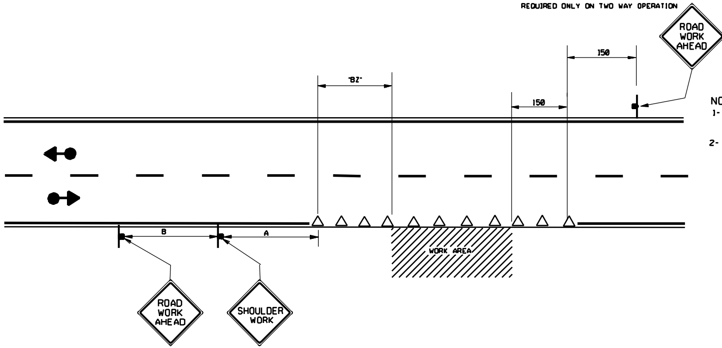
NO.	DATE	APPR.	REMARKS
1	11/26/08	GFS	DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: NOV-14-2008
CHAIRMAN STANDARDS COMMITTEE — DATE
APPROVED: NOV-14-2008
DEPUTY DIRECTOR — DATE

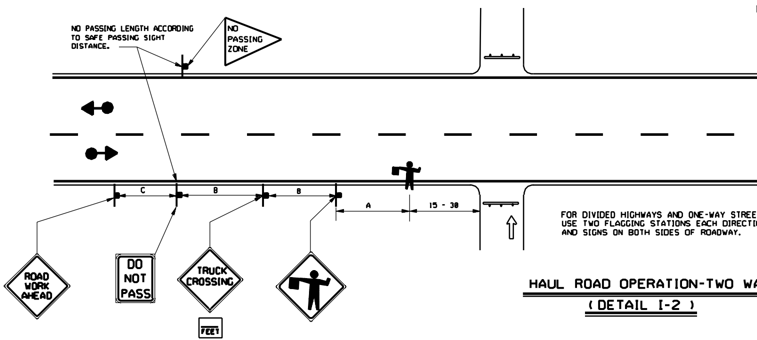
(METRIC)
STANDARD DRAWING TITLE
TRAFFIC CONTROL
MULTILANE CLOSURE

STD. DWG. NO.
745-2H



NOTES: DETAIL I-1
1- USE CHANNELIZIG DEVICES TO SEPARATE WORK ZONE FROM TRAVEL LANE WHEN WORK DURATION EXCEEDS 1 HOUR.
2- NO ENCROACHMENT INTO LANES PERMITTED

SHOULDER OPERATION
(DETAIL I-1)



NOTE: DETAIL I-2
1- INSTALL TYPE III BARRICADES WHEN HAUL ROAD IS NOT IN USE.

SAME SIGN SEQUENCE & SPACING REQUIRED FOR OPPOSITE DIRECTION OF TRAFFIC.

FOR DIVIDED HIGHWAYS AND ONE-WAY STREETS USE TWO FLAGGING STATIONS EACH DIRECTION AND SIGNS ON BOTH SIDES OF ROADWAY.

HAUL ROAD OPERATION-TWO WAY
(DETAIL I-2)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

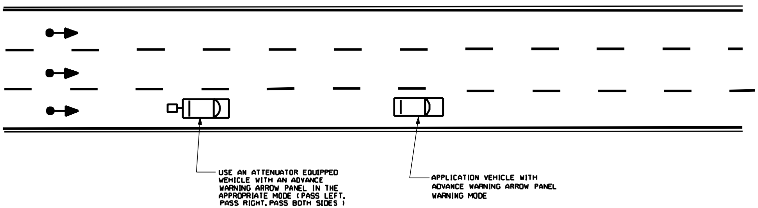
NO.	DATE	APPR.	REMARKS
1	02/01/00	B.A.	CORRECT REFERENCE IN NOTE 2 TO NOTE 13
2	09/28/00	GFS	DETAIL I-1: ADDED SIGN REQUIREMENTS REVISED NOTE 2
			DETAIL I-2: ADDED SIGN REQUIREMENTS REVISED NOTE 1
			CHANGED TRAFFIC DIRECTION ARROWS TO MATCH 745-2
			DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

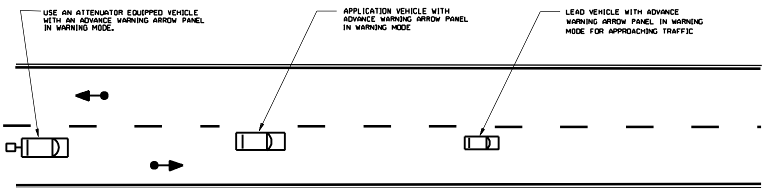
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — NOV.14.2000 DATE
APPROVED
DEPUTY DIRECTOR — NOV.14.2000 DATE

(METRIC)
TRAFFIC CONTROL SHOULDER-HAUL ROAD
STANDARD DRAWING TITLE

STD. DWG. NO.
745-2 1



MULTILANE
LANE LINES & SHOULDER
(DETAIL J-1)



TWO LANE-TWO WAY
CENTER & SHOULDER
(DETAIL J-2)

NOTES: DETAILS J-1 AND J-2

1. THE DISTANCE BETWEEN THE APPLICATING TRUCK AND THE FOLLOW OR LEAD VEHICLE SHOULD NOT BE GREATER THAN 90 m.
2. NO STATIC SIGNS ARE REQUIRED WITH THESE OPERATIONS.
3. ALL EQUIPMENT SHOULD HAVE ROTARY LIGHTS AND EMERGENCY FLASHERS IN OPERATION.
4. USE TYPE B ADVANCED WARNING ARROW PANEL. SEE STANDARD DRAWING 745-1

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	[redacted]	APPR.	REMARKS
1	10/28/00	CFS	DETAIL J-1: CHANGE REQUIREMENTS FOR FOLLOW VEHICLE DETAIL J-2: CHANGE REQUIREMENTS FOR FOLLOW VEHICLE, LEAD VEHICLE ADVANCED ARROW PANEL MODE CHANGED TO WARNING MODE. DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

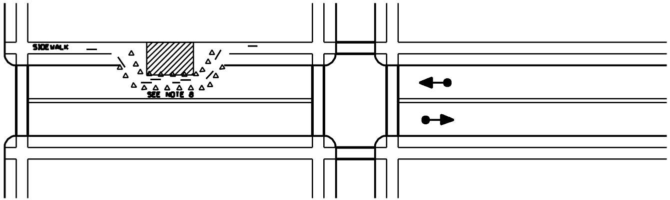
CHAIRMAN STANDARDS COMMITTEE — NOV.14,2000 DATE
APPROVED
DEPUTY DIRECTOR — NOV.14,2000 DATE

(METRIC)
TRAFFIC CONTROL
PAVEMENT MARKING
STANDARD DRAWING TITLE

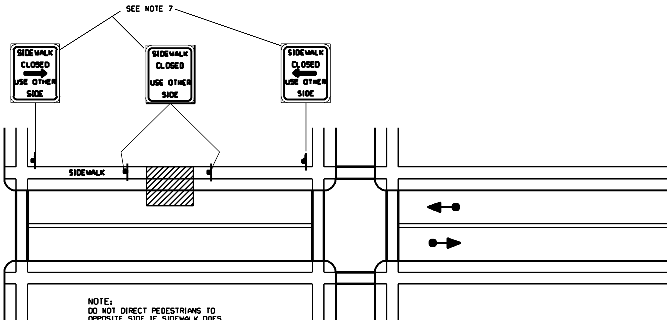
STD. DWG. NO.
745-2J

NOTES: DETAILS K-1 AND K-2

1. ONLY THE TRAFFIC CONTROL DEVICES CONTROLLING PEDESTRIAN FLOWS ARE SHOWN . OTHER DEVICES MAY BE NEEDED TO CONTROL TRAFFIC ON THE STREET. USE LANE CLOSURE SIGNING OR ROAD NARROWS SIGNS, AS NEEDED.
2. PROVIDE A TEMPORARY WALKWAY AROUND CONSTRUCTION AREA IF WALKWAY IS CLOSED TO PEDESTRIANS. IF WALKWAY CANNOT BE PROVIDED PEDESTRIANS MUST BE DIRECTED TO ALTERNATE ROUTES. (SEE DETAIL K-1 THIS SHEET)
3. CONSTRUCT WALKWAY A MINIMUM OF 1200 mm WIDE AND COVER IF POTENTIAL OF FALLING MATERIAL EXIST.
4. CONSTRUST WALKWAY WITH A WOOD FLOOR OR PAVED SURFACE SO THAT IT IS TRAVERSABLE BY A WHEELCHAIR.
5. WHEN SIDEWALKS EXIST ON BOTH SIDES OF STREET COMPLETE WORK ON ONE SIDE AND REOPEN PRIOR TO STARTING WORK ON THE OTHER SIDE.
6. MOUNT SIGNS 2 m MINIMUM HEIGHT.
7. USE A SIGN 600 mm x 900 mm MINIMUM. SIGN LEGEND TO BE 100 mm MINIMUM, SERIES "C", WITH AN ARROW 100 mm x 300 mm.
8. USE CHANNELIZING SPACED 3 m ON CENTER AND CONNECTED TO EACH OTHER WITH AN ORANGE, RED, OR YELLOW POLYVINYL RIBBON OR STREAMER 100 mm OR GREATER IN WIDTH.
9. USE A 6 m CORNER RADIUS TO DEVELOP A TEMPORARY WALKWAY AROUND A CORNER.
10. DIRECT PEDESTRIANS TO AN INTERSECTION OR MARKED CROSSWALK AS AN ALTERNATE ROUTE WHEN POSSIBLE.
11. CONSULT REGION TRAFFIC ENGINEER WHEN SCHOOL ROUTING PLANS ARE AFFECTED.



TEMPORARY WALKWAY
(DETAIL K-1)
SEE NOTE 1



ALTERNATE ROUTE
(DETAIL K-2)
SEE NOTE 1

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	10/20/00	GFS	DELETED NOTE 5, ADDED NEW NOTE 1, AND RENUMBERED EXISTING NOTES 1 THROUGH 4 AND ELIMINATED ROAD WORK AHEAD SIGNS. DETAIL NUMBERS CHANGED.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

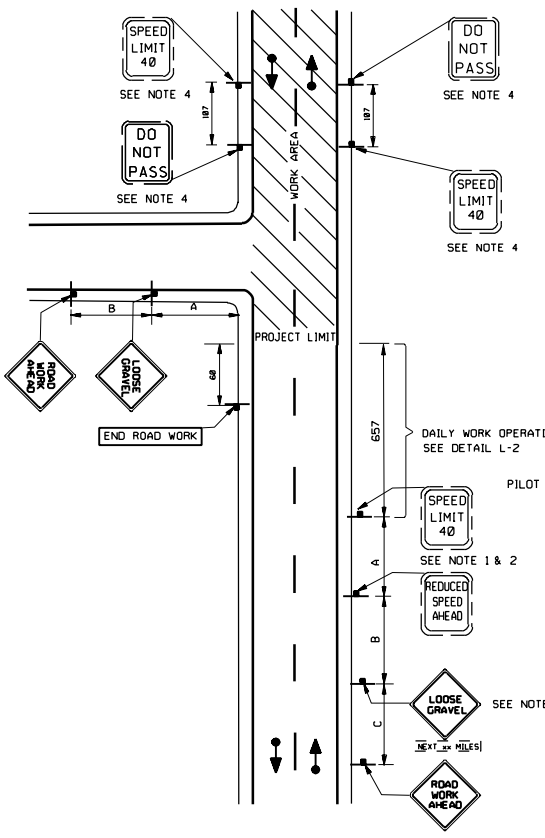
RECOMMENDED FOR APPROVAL: NOV.14,2000 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR: NOV.14,2000 DATE

(METRIC)
TRAFFIC CONTROL
PEDESTRIAN ROUTING
STANDARD DRAWING TITLE

STD. DWG. NO.
745-2K

PROJECT SIGNING
2 LANE - 2 WAY

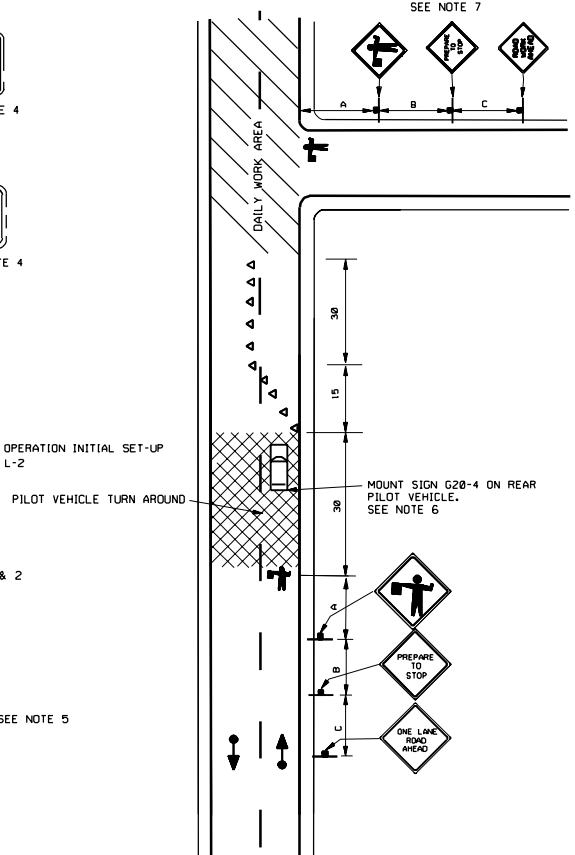
SAME SIGN SEQUENCE & SPACING REQUIRED FOR OPPOSITE DIRECTION OF TRAFFIC.



(DETAIL L-1)

DAILY WORK OPERATION
2 LANE - 2 WAY

SAME SIGN SEQUENCE, SPACING, & FLAGGER REQUIRED FOR OPPOSITE DIRECTION OF TRAFFIC.



FLAGGING /PILOT VEHICLE OPERATION
(DETAIL L-2)

NOTES: DETAILS L-1 AND L-2

1. A REDUCED SPEED LIMIT OF 40 MPH SHALL BE ESTABLISHED FOR SEAL COAT WITH COVER MATERIAL OPERATIONS. REFER TO GENERAL NOTE 9, SHEET 745-2, FOR LENGTH OF REDUCED SPEED LIMIT ZONE.
2. "SPEED REDUCED AHEAD" AND "SPEED LIMIT" SIGNING NOT REQUIRED WHEN EXISTING SPEED LIMITS ARE 40 MPH OR LESS
3. DAILY WORK OPERATION, DETAIL 2, SHALL BE MOVED AS WORK PROGRESSES.
4. PLACE "DO NOT PASS" AND SPEED LIMIT SIGNS AT 2 km INTERVALS THROUGH THE PROJECT.
5. PLACE "LOOSE GRAVEL" SIGN WITH APPROPRIATE DISTANCE MESSAGE (IN MILES). REPEAT ½ WAY THROUGH THE PROJECT. IF PROJECT LENGTH IS BETWEEN 8 km AND 16 km, REPEAT EVERY 8 km ON LONGER PROJECTS.
6. PILOT VEHICLE SHALL NOT EXCEED SPEED OF 25 MPH.
7. USE A FLAGGER AT ALL INTERSECTING ROADWAYS DURING DAILY WORK OPERATIONS AS PER DETAIL 2. REFER TO GENERAL NOTE 9, SHEET 745-2, FOR REQUIREMENTS AT OPERATING TRAFFIC SIGNALS.
8. CONTINUE FLAGGING AND PILOT VEHICLE OPERATIONS UNTIL THE ENGINEER OR THEIR REPRESENTATIVE ALLOWS FREE FLOW TRAFFIC TO PROCEED.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS				
NO.	DATE	APPR.	REMARKS	
1	8/28/01	GFS	REVISED NOTE 1	

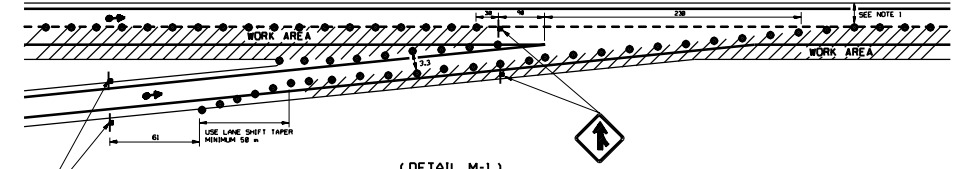
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.10.2001 DATE
DEPUTY DIRECTOR

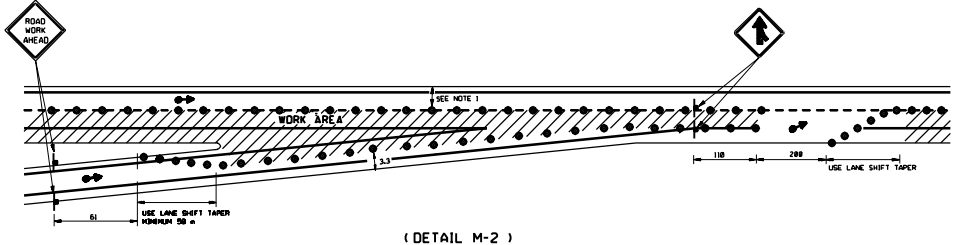
(METRIC)
STANDARD DRAWING TITLE
TRAFFIC CONTROL 2 LANE / 2 WAY SEAL COAT WITH COVER MATERIAL

STD. DWG. NO.
745-2L

TRAFFIC CONTROL FOR ENTRANCE RAMP GORE



(DETAIL M-1)



(DETAIL M-2)

NOTE : DETAILS M-1 AND M-2

1. MAINTAIN 3.6 m TRAVEL LANE AND 0.6 m SHOULDER WIDTHS.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE SHOWN.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — NOV.14.2000 DATE
APPROVED
DEPUTY DIRECTOR — NOV.14.2000 DATE

(METRIC)

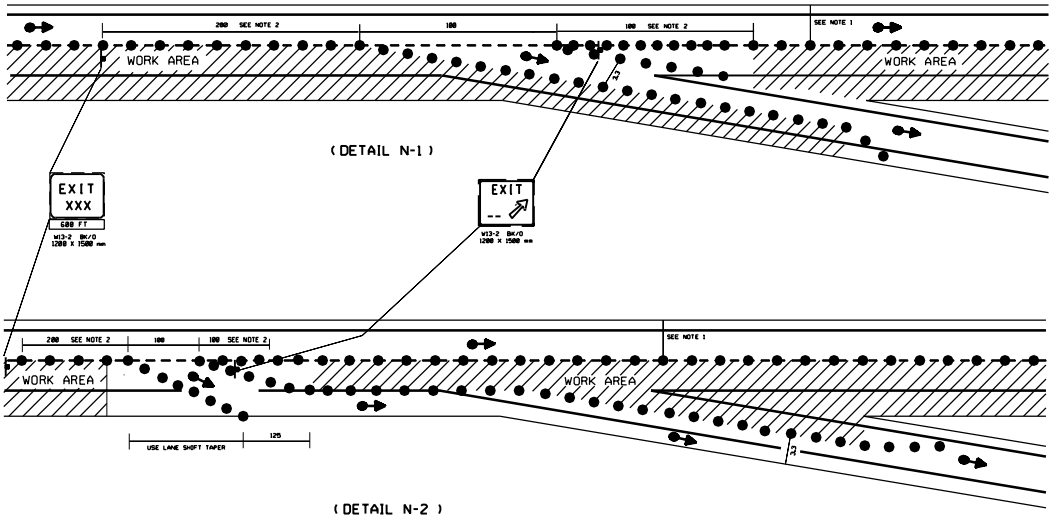
STANDARD DRAWING TITLE

TRAFFIC CONTROL ENTRANCE RAMP GORE

STD. DWG. NO.

745-2M

TRAFFIC CONTROL FOR EXIT RAMP GORE



(DETAIL N-1)

(DETAIL N-2)

NOTE : DETAILS N-1 AND N-2

1. MAINTAIN 3.6 m TRAVEL LANE AND 0.6 m SHOULDER WIDTHS.
2. USE CHANNELIZING DEVICES SPACED AT 15 m.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE SHOWN.

REVISIONS

NO.	DATE	APPR.	REMARKS

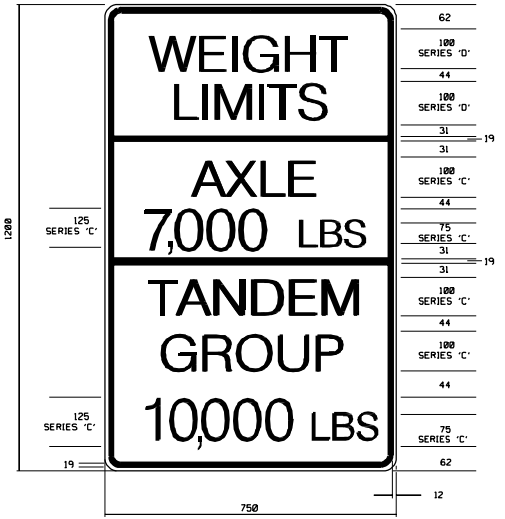
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — DATE NOV-14-2008
APPROVED
DEPUTY DIRECTOR — DATE NOV-14-2008

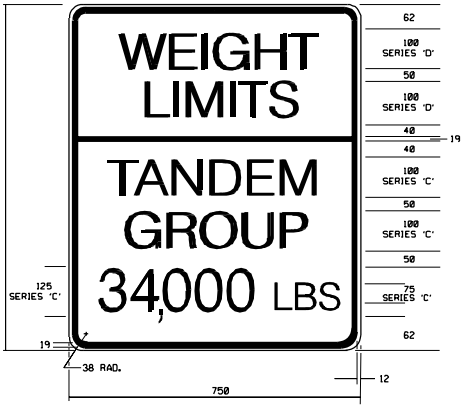
(METRIC)

STANDARD DRAWING TITLE
TRAFFIC CONTROL
EXIT RAMP GORE

STD. DWG. NO.
745-2N



R12-5B



R12-5A

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

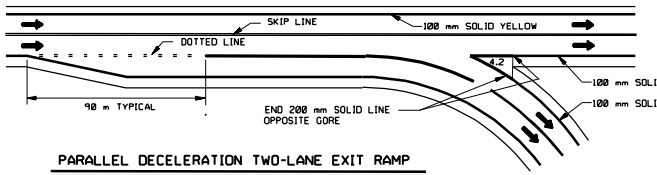
NO.	DATE	BY	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

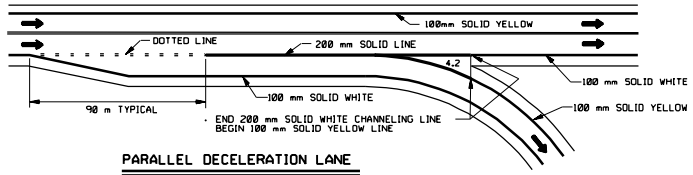
RECOMMENDED FOR APPROVAL — 03/14/1997 DATE
STANDARDS COMMITTEE CHAIRMAN — 03/14/1997 DATE
APPROVED
DEPUTY DIRECTOR

(METRIC)
STANDARD DRAWING TITLE
BRIDGE LOAD LIMITS SIGNS

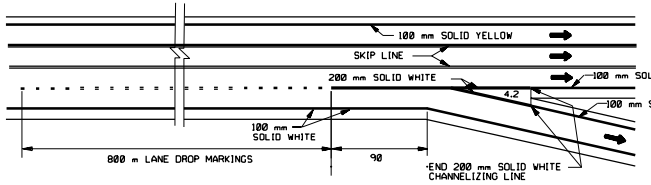
STD. DWG. NO.
R45-25



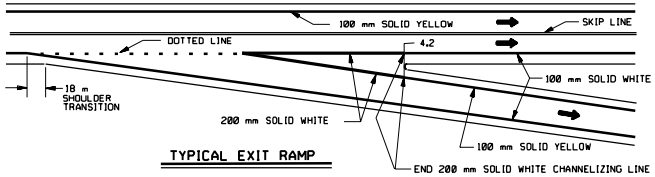
PARALLEL DECELERATION TWO-LANE EXIT RAMP



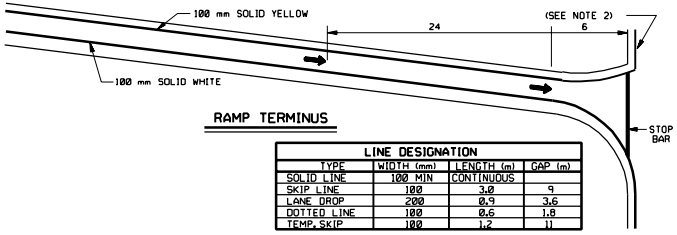
PARALLEL DECELERATION LANE



LANE DROP EXIT RAMP

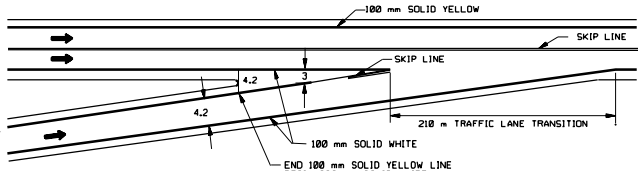


TYPICAL EXIT RAMP

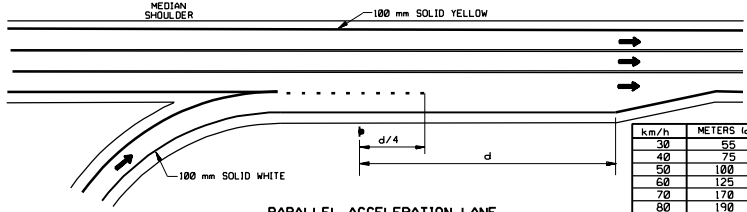


RAMP TERMINUS

LINE DESIGNATION			
TYPE	WIDTH (mm)	LENGTH (m)	GAP (m)
SOLID LINE	100 MIN	CONTINUOUS	
SKIP LINE	100	3.0	9
LANE DROP	200	0.9	3.6
DOTTED LINE	100	0.6	1.8
TEMP. SKIP	100	1.2	11

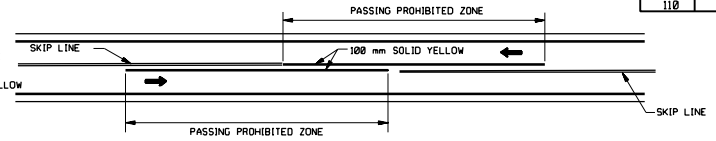


ENTRANCE RAMP

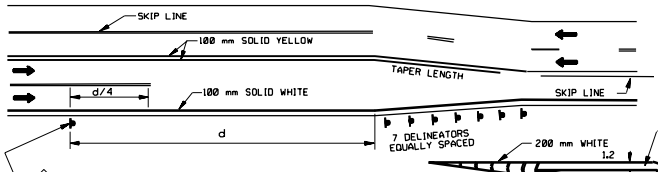


PARALLEL ACCELERATION LANE

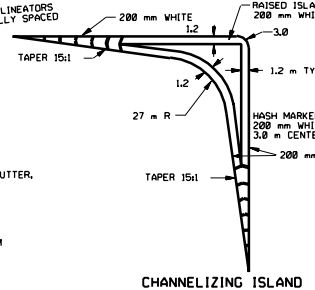
km/h	METERS (d)
30	55
40	75
50	100
60	125
70	170
80	190
90	215
100	240
110	260



TWO-LANE TWO-WAY



LANE DROP



CHANNELIZING ISLAND

NOTES:

1. ALL WHITE & YELLOW PAVEMENT MARKINGS SHALL BE FULLY REFLECTORIZED.
2. 100 mm SOLID RAMP SHOULDER MARKINGS SHALL TIE INTO EXISTING SHOULDER MARKINGS ON CROSS STREET WITH A GRADUAL TRANSITION. IF CROSS STREET HAS NO SHOULDER MARKINGS, RAMP SHOULDER MARKINGS SHALL BE DISCONTINUED AT CROSS STREET EDGE OF PAVEMENT.
3. IN AREAS WHERE TRAVELED WAY EXTENDS TO CURB AND GUTTER, A SHOULDER LINE SHALL BE USED ON MULTILANE DIVIDED HIGHWAYS PLACED DIRECTLY IN FRONT OF LIP OF GUTTER AND MAY BE USED ON OTHER CLASSES OF ROAD.
4. THE LEFT EDGE OF EACH ROADWAY OF DIVIDED HIGHWAY & STREETS SHALL BE PAINTED YELLOW SHOULDER LINE.
5. A 100 mm SOLID YELLOW LINE IS REQUIRED 300 mm FROM RAISED MEDIAN WITH YELLOW CURB.
6. CHANGES TO EXISTING OR INSTALLATION OF NEW PASS ZONES SHALL BE APPROVED BY DIVISION OF SAFETY.
7. MULTI-LANE RAMP TERMINUS TO BE DESIGNED BY TRAFFIC ENGINEER.
8. PAVEMENT MESSAGES AS PER METRIC EDITION STANDARD ALPHABETS FOR HIGHWAY SIGNS & MESSAGES.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE SHOWN.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.
2	09/29/99	B.A.	CORRECT LINE DESIGNATION IN TYPICAL EXIT RAMP DETAIL
3	08/30/00	FRW	CHANGED THE SHOULDER TRANSITION LENGTH FROM 24 m TO 18 m TO MEET THE 15:1 TAPER
4	01/23/01	FRW	REVISED NOTE 3

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — FEB.13,2001 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — FEB.13,2001 DATE
DEPUTY DIRECTOR

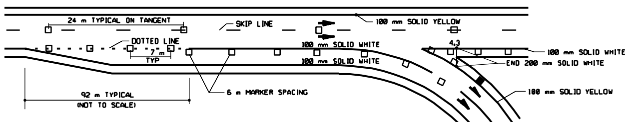
(METRIC)

STANDARD DRAWING TITLE
TYPICAL PAVEMENT MARKINGS

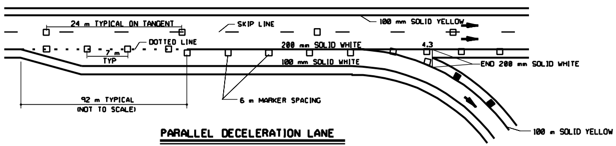
STD. DWG. NO.
745-41

NOTES:

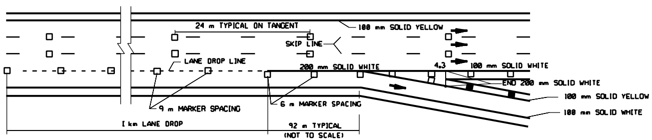
1. PLACE A MINIMUM OF 10 PLOWABLE PAVEMENT MARKERS AT 6 m CENTERS IN EACH SIDE OF GORE FROM BEGINNING OF GORE. (MINIMUM TOTAL = 60 m)
2. CLEAR MARKERS WILL SUPPLEMENT WHITE PAINT LINES. YELLOW MARKERS WILL SUPPLEMENT YELLOW PAINT LINES.
3. ALL OTHER LOCATIONS FOR INSTALLATION OF PLOWABLE PAVEMENT MARKERS WILL BE APPROVED BY THE REGION TRAFFIC ENGINEER.



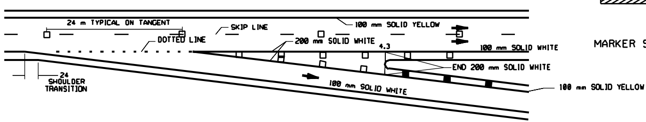
PARALLEL DECELERATION TWO-LANE EXIT RAMP



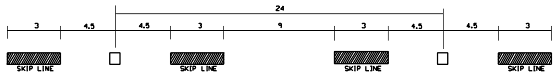
PARALLEL DECELERATION LANE



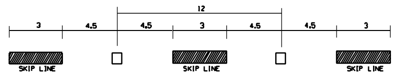
LANE DROP EXIT RAMP



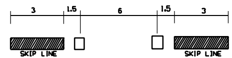
TYPICAL EXIT RAMP



24 m MARKER SPACING BETWEEEN SKIP LINES
FOR R > 580 m

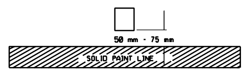


12 m MARKER SPACING BETWEEEN SKIP LINES
FOR 580 m ≥ R ≥ 120 m



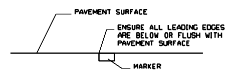
6 m MARKER SPACING BETWEEEN SKIP LINES
FOR R < 120 m

DETAIL "A"



DETAIL "B"

MARKER SUPPLEMENTING SOLID PAINT LINE



DETAIL "C"

MARKER IN PAVEMENT SURFACE

LEGEND

- □ = CLEAR ONE WAY MARKER
- ■ = YELLOW ONE WAY MARKER
- R = RADIUS OF CURVE

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE		REMARKS
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT. BASE UNIT CHANGED TO METERS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

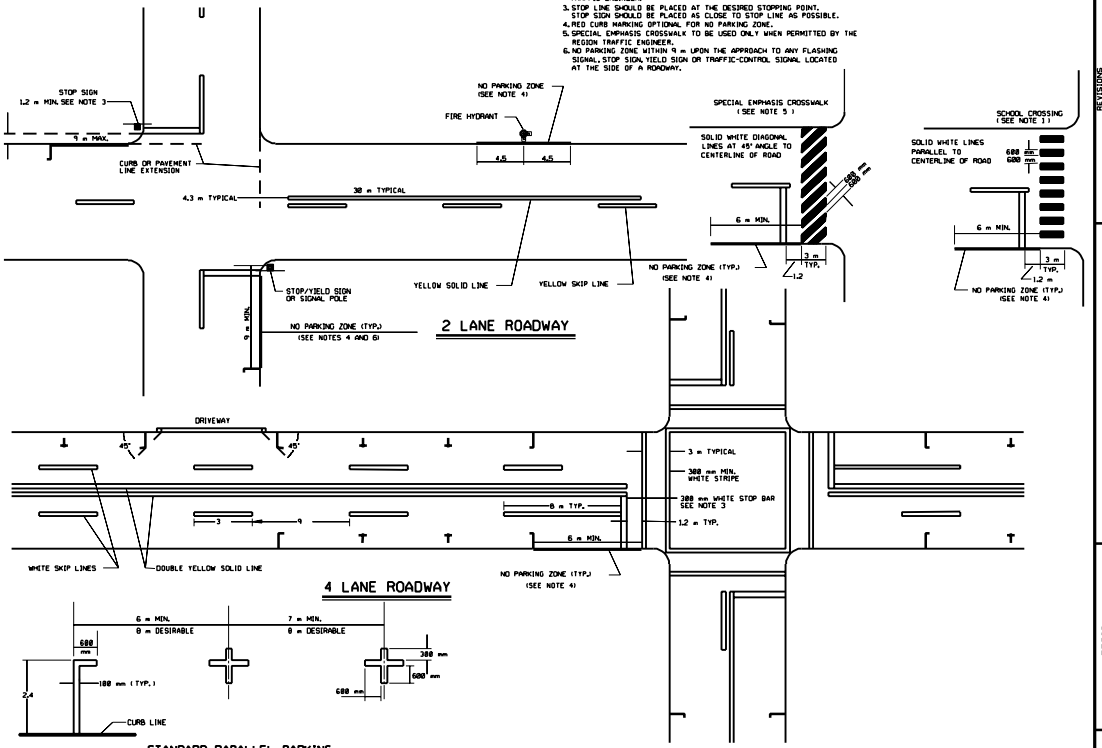
RECOMMENDED FOR APPROVAL — APR.22,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — APR.22,1999 DATE

(METRIC)
PLOWABLE PAVEMENT MARKERS
STANDARD DRAWING TITLE

STD. DWG. NO.
745-42

NOTES:

1. NUMBER & LOCATION OF CROSSWALKS AT AN INTERSECTION TO BE DETERMINED BY REGION TRAFFIC ENGINEER.
2. WIDER STOP LINE TO BE USED ONLY WHEN PERMITTED BY THE REGION TRAFFIC ENGINEER.
3. STOP LINE SHOULD BE PLACED AT THE DESIRED STOPPING POINT. STOP SIGN SHOULD BE PLACED AS CLOSE TO STOP LINE AS POSSIBLE.
4. RED CURB MARKING OPTIONAL FOR NO PARKING ZONE.
5. SPECIAL EMPHASIS CROSSWALK TO BE USED ONLY WHEN PERMITTED BY THE REGION TRAFFIC ENGINEER.
6. NO PARKING ZONE WITHIN 9 m UPON THE APPROACH TO ANY FLASHING SIGNAL, STOP SIGN, YIELD SIGN OR TRAFFIC-CONTROL SIGNAL LOCATED AT THE SIDE OF A ROADWAY.



ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	8/22/1994	B.A.	BASE UNIT CHANGED TO METERS. DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR-22-1994 DATE

STANDARDS & SPECIFICATIONS COMMITTEE

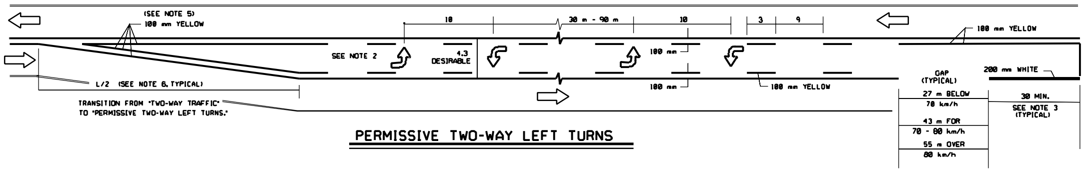
APPROVED — APR-22-1994 DATE

DEPUTY DIRECTOR

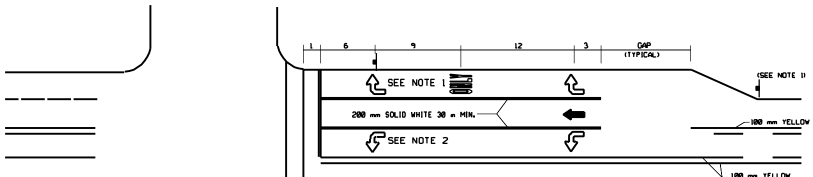
(METRIC)

CROSSWALKS, PARKING AND INTERSECTION APPROACHES

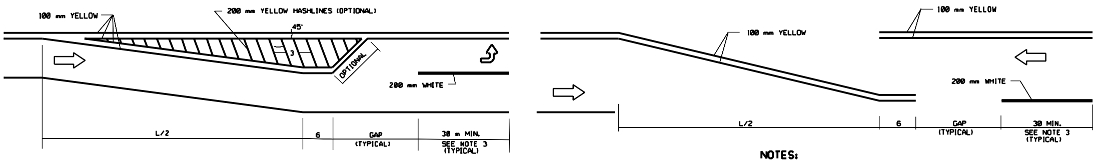
STD. DWG. NO.
745-44



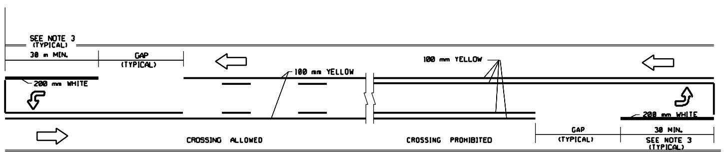
PERMISSIVE TWO-WAY LEFT TURNS



INTERSECTION LANE APPROACH



PAINTED LEFT TURN LANES



PAINTED MEDIAN

NOTES:

1. ARROW MARKINGS SHALL BE USED FOR ALL MANDATORY TURN LANES, WHERE A MOVEMENT THAT WOULD OTHERWISE BE LEGAL IS TO BE PROHIBITED, AND SHALL BE ACCOMPANIED BY STANDARD SIGNS (R3-7R) AND THE WORD "ONLY". OTHERWISE THEY ARE OPTIONAL.
2. ARROW PAVEMENT MARKINGS ARE OPTIONAL FOR TWO-WAY LEFT TURN LANES AND LEFT TURN LANES.
3. LENGTH OF STORAGE FOR TURNING LANE IS TO BE DETERMINED BY CAPACITY ANALYSIS, BUT SHOULD NOT BE LESS THAN 30m.
4. PAVEMENT MESSAGES AS PER MUTCD STANDARD ALPHABET FOR HIGHWAY SIGNS AND MARKINGS.
5. LEFT TURNS PROHIBITED ACROSS ISLANDS AND MEDIANS FORMED BY TWO DOUBLE YELLOW LINES (TOTAL IS 4 YELLOW LINES).
6. TAPER FORMULA: L=(2/3)SW FOR SPEEDS OF 70 km/h OR GREATER
   L=(1/3)SW FOR SPEEDS OF 65 km/h OR LESS

   WHERE: L = MINIMUM LENGTH OF TAPER.
   S = POSTED SPEED LIMIT.
   W = WIDTH OF OFFSET.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

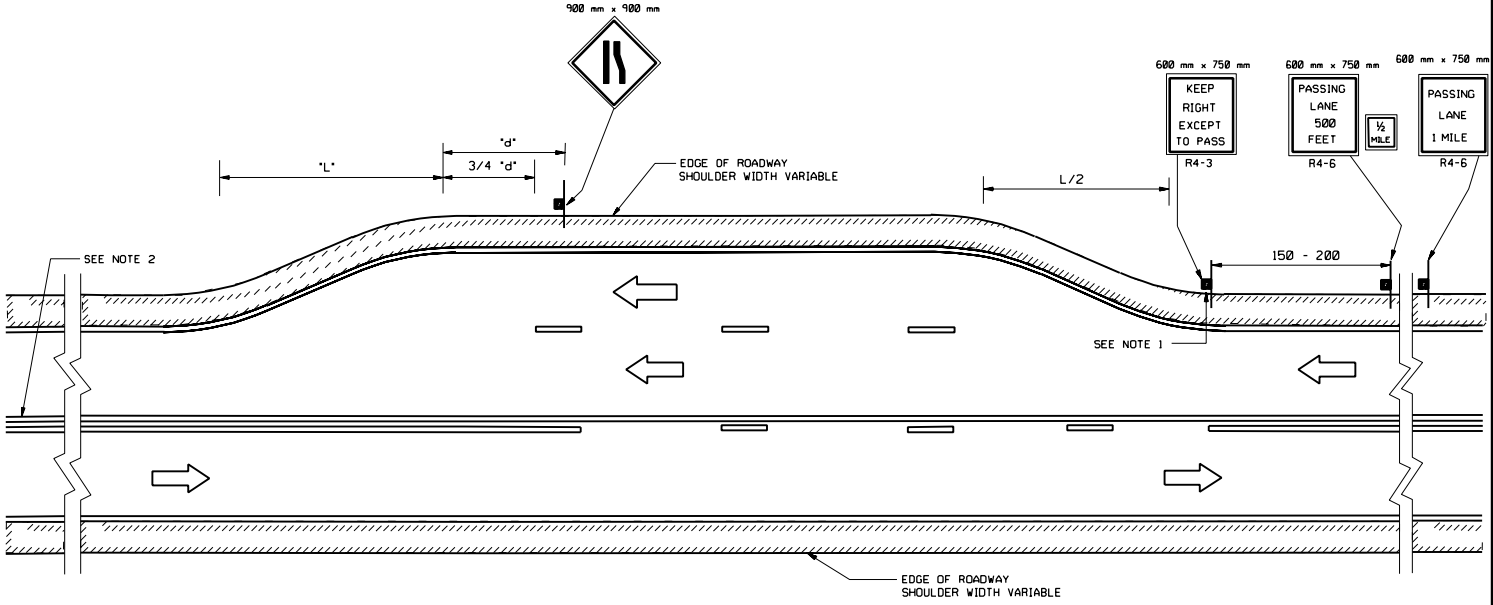
NO.	DATE	APPR.	REVISIONS / REMARKS
1	04/22/99	B.A.	BASE UNIT CHANGED TO METERS. DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE APPROVED — APR. 22, 1999 DATE
DEPUTY DIRECTOR — APR. 22, 1999 DATE

(METRIC)
PAINTED MEDIAN & AUXILIARY LANE DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
745-45



NOTE:

1. WHEN PASSING LANE EXCEEDS 4 km IN LENGTH THE R4-3 SIGN SHOULD BE REPEATED AT 2 km INTERVALS.
2. DOWN GRADE PASSING MAY BE PERMITTED, PROVIDED PASSING ZONE CRITERIA IS MET. "NO PASSING" MARKINGS SHALL BE USED THROUGH AND BEYOND THE TRANSITION AREA UNTIL ADEQUATE SIGHT DISTANCE IS PROVIDED.
3. "d" SEE TABLE II
4. FOR SPEEDS 70 km/h OR OVER
   $L = S \times W \times 2/3$ OR TABLE I
   FOR SPEEDS 60 Km/h OR LESS
   $L = \frac{WS}{3}$ OR TABLE I
   L = LENGTH IN METER
   S = 85th PERCENTILE SPEED km/h
   W = OFFSET IN METERS

TABLE I

DESIGN SPEED km/h	AVERAGE RUNNING SPEED km/h	MIN. TRUCK SPEED km/h	"L" TRANSITION LENGTH	L/2 TRANSITION LENGTH
50	45	21	60	30
60	58	34	85	42
70	65	40	150	75
80	71	47	180	90
100	84	48	230	115
110	93	48	250	125
120	103	48	275	137

TABLE II

km/h	METERS (d)
30	55
40	75
50	100
60	125
70	170
80	190
90	215
100	240
110	260

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	01/13/98	B.A.	UPDATED FROM DI TEAM
2	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT
3	03/23/00	M.C.	DRAWING TITLE CHANGE, ADDED TABLE I, MODIFIED NOTE 3

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.11.2000 DATE

CHAIRMAN STANDARDS COMMITTEE — APPROVED — APR.11.2000 DATE

DEPUTY DIRECTOR

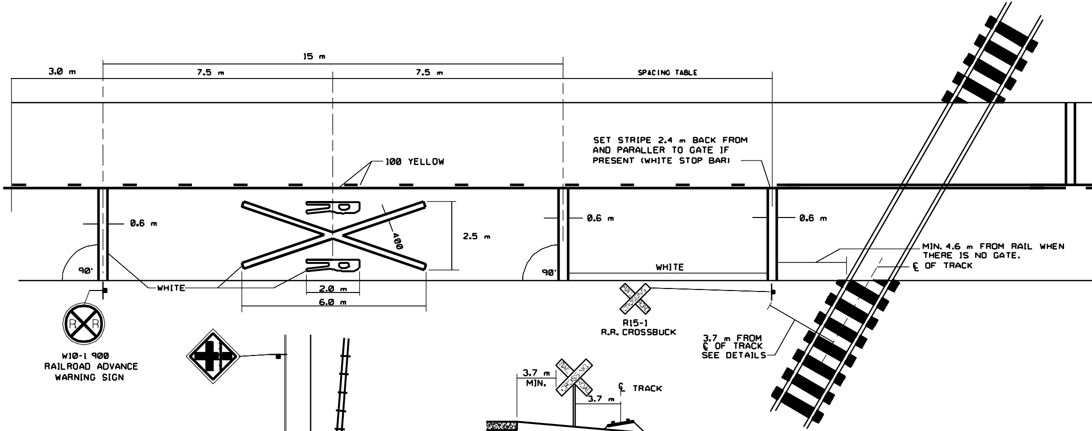
(METRIC)

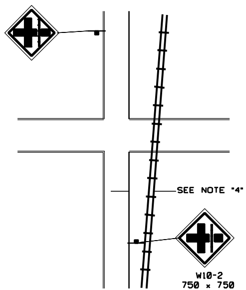
STANDARD DRAWING TITLE

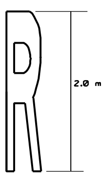
PASSING / CLIMBING LANES
TRAFFIC CONTROL

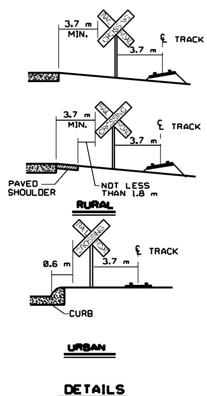
STD. DWG. NO.

745-46









SPACING TABLE

SPEED LIMIT	MIN. DISTANCE (m)
110	230
90 - 100	170
70 - 80	115
60	70
40 - 50	30

NOTES:

1. PAVEMENT MARKINGS IN ADVANCE OF A GRADE CROSSING SHALL CONSIST OF AN X, THE LETTERS RR, A NO PASSING MARKING (2-LANE ROADS), AND CERTAIN TRANSVERSE LINES. PLACE IN EACH APPROACH LANE ON ALL PAVED APPROACHES TO GRADE CROSSING WHERE GRADE CROSSING SIGNALS OR AUTOMATIC GATES ARE LOCATED, AND AT ALL OTHER GRADE CROSSINGS WHERE THE PREVAILING SPEED OF HIGHWAY TRAFFIC IS 60 km/h OR GREATER.
   THE MARKINGS SHALL ALSO BE PLACED AT CROSSINGS WHERE THE ENGINEERING STUDIES INDICATE THERE IS A SIGNIFICANT POTENTIAL CONFLICT BETWEEN VEHICLES AND TRAINS.
2. ON MULTI-LANE ROADS THE TRANSVERSE BANDS SHOULD EXTEND ACROSS ALL APPROACH LANES AND INDIVIDUAL R X R SYMBOLS SHALL BE USED IN EACH APPROACH LANE.
3. WHERE THERE IS A STREET INTERSECTION BETWEEN THE W10-1 AND THE CROSSING, AN ADDITIONAL W10-1 SHOULD BE USED TO WARN TRAFFIC APPROACHING THE CROSSING FROM THE INTERSECTION.
4. USE W10-2 SIGNS WHERE THERE IS NO W10-1 SIGNS BETWEEN INTERSECTION AND TRACK.
5. FOR DIMENSIONS FOR RAILROAD PAVEMENT MARKINGS REFER TO STANDARD HIGHWAYS MANUAL, STANDARD ALPHABET FOR HIGHWAY SIGNS & PAVEMENT MARKINGS, METRIC EDITION.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

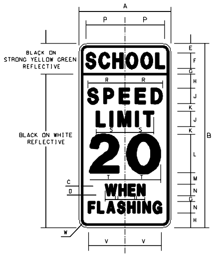
	DATE	APPR.	REMARKS
1	04/27/99	B.A.	CORRECT DIMENSION NOTE
2	10/25/99	GRB	REVISED CENTERLINE STRIP ACROSS TRACK

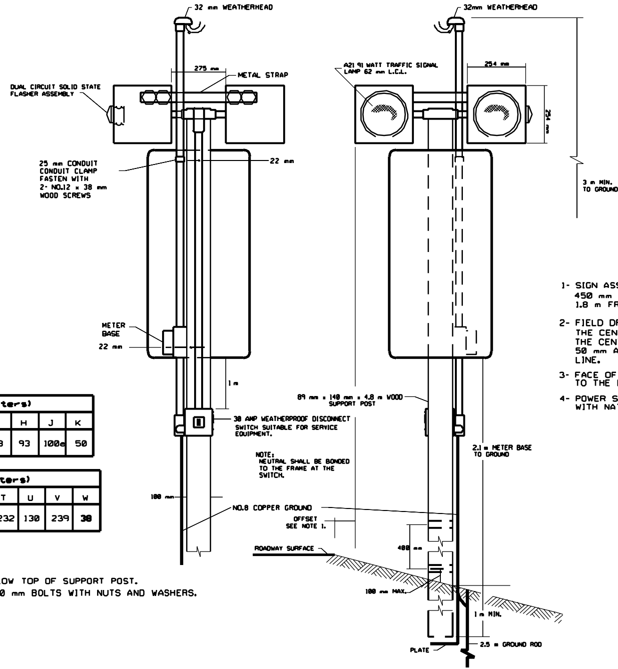
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — DEC 14,1999 DATE
APPROVED — DEPUTY DIRECTOR — DEC 14,1999 DATE

(METRIC)
PAVEMENT MARKINGS AND SIGNS AT RAILROAD CROSSING
STANDARD DRAWING TITLE

STD. DWG. NO.
745-47





SIGN	DIMENSION (millimeters)									
	A	B	C	D	E	F	G	H	J	K
STANDARD or MINIMUM	600	1200	10	19	62	100d	38	93	100e	50

SIGN	DIMENSION (millimeters)									
	L	M	N	P	R	S	T	U	V	W
STANDARD or MINIMUM	250e	76	75d	257	244	187	232	130	239	38

ASSEMBLY

1- TOP OF SIGN IS TO BE 200 mm BELOW TOP OF SUPPORT POST. ATTACH TO POSTS WITH 175 mm x 10 mm BOLTS WITH NUTS AND WASHERS.

INSTALLATION

1- SIGN ASSEMBLY OFFSET SHOULD BE A MINIMUM OF: 450 mm FROM FACE OF CURB. 1.8 m FROM TRAVELED WAY IN ABSENCE OF CURB.

2- FIELD DRILL TWO 38 mm DIAMETER HOLES IN THE CENTER OF THE POST. DRILL PERPENDICULAR TO THE CENTER LINE OF THE ROAD. PLACE ONE HOLE AT 50 mm AND ONE AT 450 mm ABOVE THE GROUND LINE.

3- FACE OF SIGN SHOULD BE INSTALLED AT 90° ANGLE TO THE EDGE OF ROADWAY.

4- POWER SUPPLY 120 VOLTS, INSTALLED IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

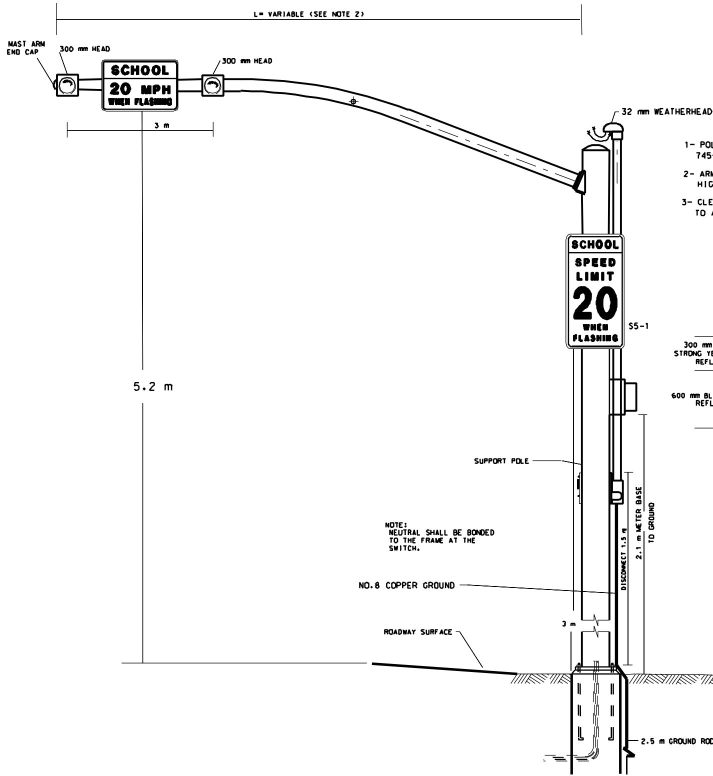
NO.	DATE	REMARKS
1	04/22/99	B.A. DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.
2	10/23/00	F.L. CHANGED COLOR YELLOW TO STRONG YELLOW GREEN

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL NOV 14, 2000 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED NOV 14, 2000 DATE
DEPUTY DIRECTOR

(METRIC)
FLASHING SCHOOL SIGN
STANDARD DRAWING

STD. DWG. NO.
745-48A

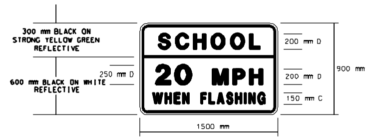


NOTES

1- POLES , ARMS & FOUNDATION SEE STANDARD DRAWINGS 745-55A1, A2, C.

2- ARM LENGTH SHOULD BE DESIGNED INDIVIDUALLY DEPENDING ON HIGHWAY GEOMETRICS.

3- CLEAR ZONE PROTECTION SHALL BE PROVIDED ACCORDING TO AASHTO GUIDELINES.



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS				
NO.	DATE	APPR.	REMARKS	
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.	
2	10/23/00	F.L.	CHANGED COLOR YELLOW TO STRONG YELLOW GREEN	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

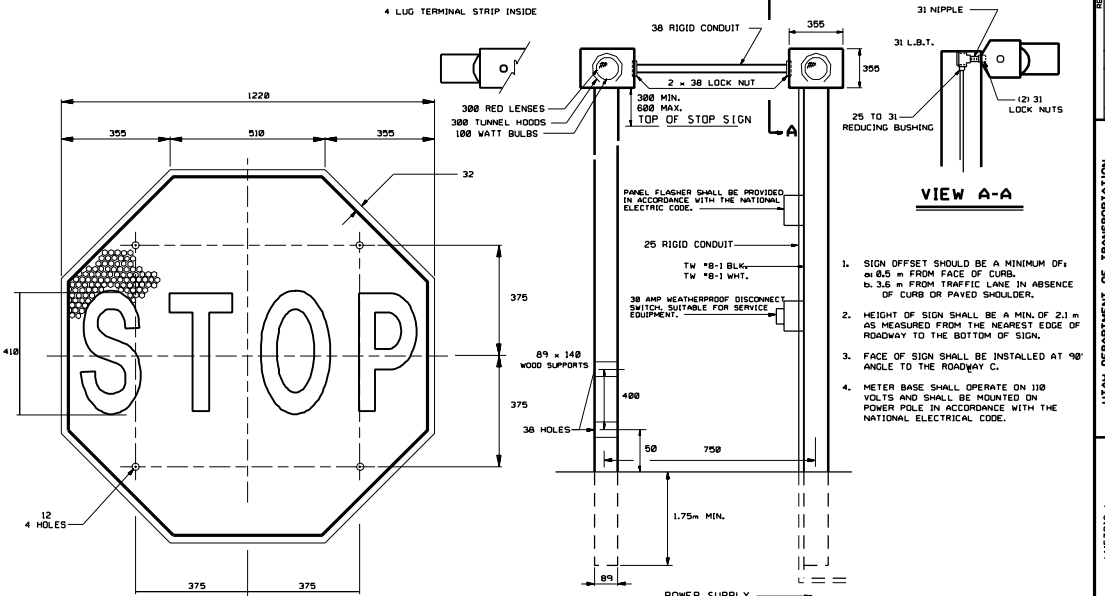
RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE APPROVED — NOV 14,2000 DATE

DEPUTY DIRECTOR — NOV 14,2000 DATE

(METRIC)
OVERHEAD SCHOOL FLASHER
STANDARD DRAWING TITLE

STD. DWG. NO.
745-48B



1. SIGN OFFSET SHOULD BE A MINIMUM OF:
   a. 0.5 m FROM FACE OF CURB.
   b. 3.6 m FROM TRAFFIC LANE IN ABSENCE OF CURB OR PAVED SHOULDER.
2. HEIGHT OF SIGN SHALL BE A MIN. OF 2.1 m AS MEASURED FROM THE NEAREST EDGE OF ROADWAY TO THE BOTTOM OF SIGN.
3. FACE OF SIGN SHALL BE INSTALLED AT 90° ANGLE TO THE ROADWAY ℄.
4. METER BASE SHALL OPERATE ON 110 VOLTS AND SHALL BE MOUNTED ON POWER POLE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/27/99	B.A.	DRAWING ELECTRONICALLY ENHANCED NO CHANGE IN CONCEPT CORRECT EXPANSION NOTE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DATE APR.27,1999
STANDARD SPECIFICATIONS COMMITTEE
APPROVED — DATE APR.27,1999
DEPUTY DIRECTOR

(METRIC)
FLASHING STOP SIGN
STANDARD DRAWING TITLE

STD. DWG. NO.
745-49

HORIZONTAL SIGN DIMENSION (W)

Rows: VERTICAL SIGN DIMENSION (V). Each cell gives, top: number, size and weight of support section or of standard strength pipe columns; bottom: minimum required depth of footing.

ONE POST PER SIGN

V \ W	0.3	0.6	0.9	1.2	1.5
0.30	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90
0.45	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90
0.60	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90
0.75	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90
0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 0.90	0.102 Ø 0.90
1.20	0.075 Ø 0.90	0.075 Ø 0.90	0.075 Ø 1.05	0.102 Ø 1.05	0.102 Ø 1.05
1.50	0.075 Ø 0.90	0.075 Ø 0.90	0.102 Ø 1.05	0.102 Ø 1.05	0.127 Ø 1.05
1.80	0.075 Ø 0.90	0.102 Ø 0.90	0.102 Ø 0.90	0.127 Ø 0.90	0.127 Ø 0.90
2.10	0.075 Ø 0.90	0.102 Ø 0.90	0.102 Ø 0.90	0.127 Ø 0.90	0.127 Ø 1.05
2.40	0.075 Ø 0.90	0.102 Ø 0.90	0.127 Ø 0.90	0.127 Ø 1.05	0.152 Ø 1.20
2.70	0.075 Ø 0.90	0.102 Ø 0.90	0.127 Ø 1.05	0.152 Ø 1.20	0.152 Ø 1.20
3.00	0.075 Ø 0.90	0.127 Ø 0.90	0.127 Ø 1.05	0.152 Ø 1.20	0.152 Ø 1.65
3.30	0.102 Ø 0.90	0.127 Ø 0.90	0.152 Ø 1.05	0.152 Ø 1.35	0.203 Ø 1.50
3.60	0.102 Ø 0.90	0.127 Ø 0.90	0.152 Ø 1.20	0.152 Ø 1.35	0.203 Ø 1.50
3.90	0.102 Ø 0.90	0.127 Ø 1.05	0.152 Ø 1.20	0.203 Ø 1.50	0.203 Ø 1.65
4.20	0.102 Ø 0.90	0.127 Ø 1.05	0.152 Ø 1.35	0.203 Ø 1.50	0.203 Ø 1.65
4.50	0.102 Ø 0.90	0.152 Ø 1.05	0.152 Ø 1.35	0.203 Ø 1.65	0.203 Ø 1.80
4.80	0.102 Ø 0.90	0.152 Ø 1.20	0.203 Ø 1.35	0.203 Ø 1.65	0.203 Ø 1.80

TWO POSTS PER SIGN

V \ W	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8
0.30	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90
0.45	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S100x14.1 0.90	S100x14.1 0.90
0.60	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90
0.75	S75x8 0.90	S5x8 0.90	S75x8 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90
0.90	S75x8 0.90	S75x8 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S150x19 1.05	S150x19 0.90	S150x19 0.90
1.20	S100x14.1 1.05	S100x14.1 1.05	S100x14.1 1.05	S100x14.1 1.20	S100x14.1 1.05	S150x19 1.05	S150x19 1.05	S150x19 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.05
1.50	S100x14.1 1.05	S100x14.1 1.20	S100x14.1 1.20	S150x19 1.35	S150x19 1.20	S150x19 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.20	S150x19 1.20
1.80	S100x14.1 1.20	S150x19 1.20	S150x19 1.35	S150x19 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.20	S150x19 1.20	S150x26 1.20	S150x26 1.35	S200x27 1.35
2.10	S150x19 1.20	S150x19 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.20	S150x26 1.20	S150x26 1.35	S200x27 1.35	S200x27 1.35	S200x27 1.50
2.40	S150x19 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.20	S150x19 1.20	S150x26 1.35	S200x27 1.35	S200x27 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65
2.70	S150x19 1.05	S150x19 1.05	S150x19 1.20	S150x26 1.20	S150x26 1.35	S200x27 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65	S200x27 1.65	S200x27 1.65
3.00	S150x19 1.05	S150x19 1.20	S150x26 1.35	S150x26 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65	S200x27 1.65	S200x27 1.80	W250x28 1.80	W250x28 1.95
3.30	S150x19 1.20	S150x26 1.35	S150x26 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65	S200x27 1.65	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x28 2.10
3.60	S50x19 1.20	S150x26 1.35	S200x27 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x33 1.95	W250x33 2.10
3.90	S150x26 1.20	S200x27 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x33 2.10
4.20	S150x26 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.65	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x39 2.25	W250x39 2.25
4.50	S200x27 1.35	S200x27 1.50	S200x27 1.65	S200x27 1.65	W250x28 1.80	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x39 2.25	W250x45 2.25	W250x45 2.40
4.80	S200x27 1.50	S200x27 1.50	S200x27 1.65	W250x28 1.80	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x39 2.25	W250x45 2.25	W250x45 2.40	W250x45 2.55

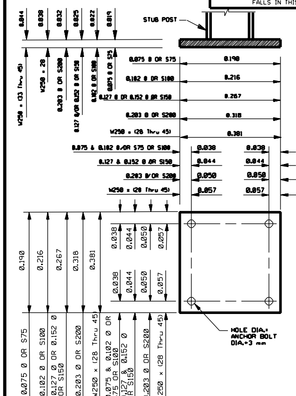
USE 3 m WIDTH IF SIZE FALLS IN THIS AREA

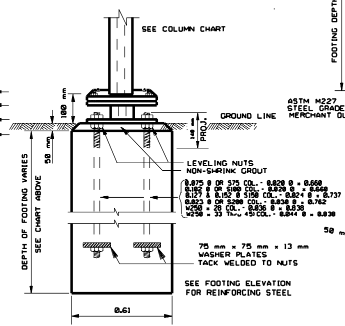
THREE POSTS PER SIGN

V \ W	5.1	5.4	5.7	6.1	6.4	6.7	7.0	7.3
0.30	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90
0.45	S75x8 0.90	S75x8 0.90	S75x8 0.90	S75x8 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90
0.60	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90
0.75	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S150x19 0.90	S150x19 0.90
0.90	S100x14.1 0.90	S100x14.1 0.90	S100x14.1 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.05
1.20	S150x19 1.05	S150x19 1.05	S150x19 0.90	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.05
1.50	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.05	S150x19 1.20	S150x19 1.20	S150x19 1.20	S150x26 1.20
1.80	S150x19 1.05	S150x19 1.20	S150x19 1.20	S150x26 1.20	S150x26 1.20	S150x26 1.35	S200x27 1.35	S150x26 1.35
2.10	S150x26 1.20	S150x26 1.20	S150x26 1.35	S200x27 1.35	S200x27 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.50
2.40	S200x27 1.35	S200x27 1.35	S200x27 1.35	S200x27 1.50	S200x27 1.50	S200x27 1.50	S200x27 1.65	S200x27 1.65
2.70	S200x27 1.50	S200x27 1.50	S200x27 1.50	S200x27 1.50	S200x27 1.65	S200x27 1.65	W250x28 1.65	W250x28 1.80
3.00	S200x27 1.65	S200x27 1.80	S200x27 1.80	S200x27 1.80	W250x28 1.80	W250x28 1.95	W250x28 1.95	W250x28 1.95
3.30	S200x27 1.65	S200x27 1.65	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x28 1.95	W250x28 2.10	W250x33 2.10
3.60	W250x28 1.65	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x33 2.10
3.90	W250x28 1.80	W250x28 1.80	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x33 2.10	W250x33 2.10	W250x33 2.25
4.20	W250x28 1.95	W250x33 1.95	W250x33 2.10	W250x33 2.10	W250x33 2.10	W250x39 2.25	W250x39 2.25	W250x45 2.40
4.50	W250x33 1.95	W250x33 2.10	W250x33 2.10	W250x39 2.25	W250x39 2.25	W250x39 2.25	W250x45 2.40	W250x45 2.40
4.80	W250x33 2.10	W250x33 2.10	W250x39 2.25	W250x39 2.25	W250x45 2.40	W250x45 2.40	W250x45 2.55	W250x45 2.55

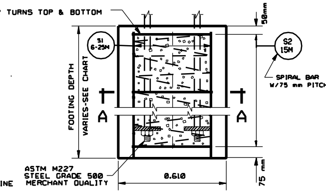
WIDTH W (m)	SPACING FOR POSTS
0.30-1.50	ONE POST
1.80	0.30*1.20*0.30
2.10	0.30*1.50*0.30
2.40	0.30*1.80*0.30
2.70	0.30*2.10*0.30
3.00	0.30*2.40*0.30
3.30	0.45*2.40*0.45
3.60	0.60*2.40*0.60
3.90	0.75*2.40*0.75
4.20	0.90*2.40*0.90
4.50	1.05*2.40*1.05
4.80	1.20*2.40*1.20
5.10	0.30*2.25*2.25*0.30
5.40	0.30*2.40*2.40*0.30
5.70	0.45*2.40*2.40*0.45
6.10	0.65*2.40*2.40*0.65
6.40	0.800*2.40*2.40*0.80
6.70	0.95*2.40*2.40*0.95
7.00	1.10*2.40*2.40*1.10
7.30	1.25*2.40*2.40*1.25

(*)REPRESENTS ONE POST



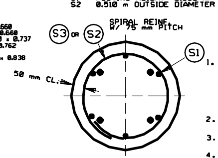


FOOTING DETAILS

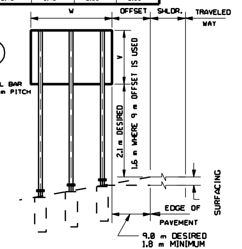


FOOTING ELEVATION

BAR	LENGTH
S1	FOOTING HEIGHT- 0.050 m
S2	0.510 m OUTSIDE DIAMETER



SECTION A - A



REAR ELEVATION

NOTES:

1. ENTER CHART WITH KNOWN HORIZONTAL AND VERTICAL DIMENSIONS OF SIGN. PROCEED HORIZONTALLY AND VERTICALLY FROM GIVEN DIMENSIONS TO INTERSECTING SQUARE WHICH GIVES IN ORDER, TOP: NUMBER, SIZE AND WEIGHT OF SUPPORT SECTION OR OF STANDARD STRENGTH PIPE COLUMNS. BOTTOM: MINIMUM REQUIRED DEPTH OF FOOTING.
2. SEE STD. DWG. 745-50B FOR MATERIAL SPECIFICATIONS NOT GIVEN AND GENERAL NOTES.
3. SIGNS SHALL NOT BE ATTACHED BELOW HINGE POINT.
4. W-SHAPES AND S-SHAPES UNITS ARE IN MILLIMITERS AND kg/m.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE SHOWN.

REVISIONS				
1	07/14/98		CHANGED DIMENSION IN REAR ELEVATION DETAIL	
2	01/25/99	D.S.	REVISE FOOTING DETAIL.	
	DATE	APPR.		REMARKS

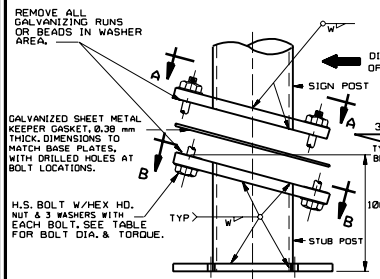
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — FEB.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — FEB.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
GROUND MOUNTED SIGNS INSTALLATION DETAILS

STANDARD DRAWING TITLE

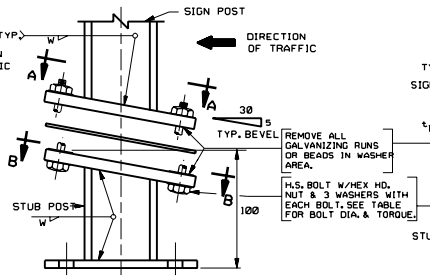
STD. DWG. NO.
745-50A



SIGN POST & STUB POST

ELEVATION

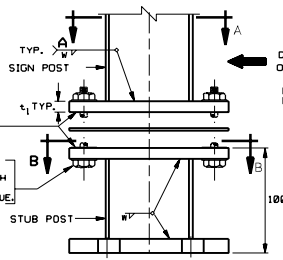
(FOR PIPE COLUMNS)



SIGN POST & STUB POST

ELEVATION

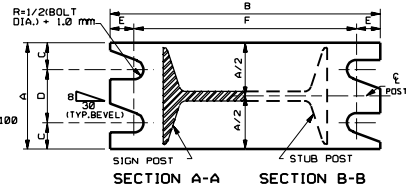
(FOR S75 & S100 SECTIONS)



SIGN POST & STUB POST

ELEVATION

(FOR S150, S200 & W250 SECTIONS)



SECTION A-A SECTION B-B

(SEE TABLE FOR DIMENSIONS)

SECTIONS SHOWN ARE FOR INSTALLATIONS ON RIGHT SHOULDER AND IN GORE. PLATE SLOT BEVELS ARE OPPOSITE HAND FROM THAT SHOWN FOR INSTALLATION ON LEFT SHOULDER. "S" POST IS SHOWN. PIPE POST SELECTIONS ARE SIMILAR.

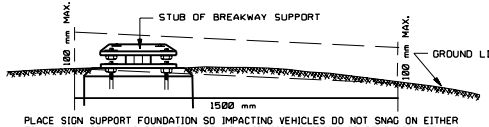
BASE CONNECTION DATA TABLE

POST SIZE	BOLT SIZE & TORQUE	A	B	C	D	E	F	t_1	W
S75 x 8.0	13 DIA.x 64 13.6 N•m TORQUE	76	190	19	38	19	152	16	5
S100 x 14.1		89	190	19	51	19	152	16	6
S150 x 19.0	16 DIA. x 75 32.5 N•m TORQUE	114	254	29	56	19	216	19	8
S150 x 26.0		114	254	29	56	19	216	19	8
S200 x 27.0		127	305	29	64	19	267	19	8
W250 x 28.0	20 DIA.x 89 51.5 N•m TORQUE	152	368	32	88	22	324	25	8
W250 x 33.0		178	381	38	102	22	337	25	8
W250 x 39.0		178	381	38	102	22	357	25	8
W250 x 45.0	21 DIA.x 89 69.6 N•m TORQUE	178	381	38	102	22	337	29	8
75 DIA. STD. PIPE	13 DIA.x 64 13.6 N•m TORQUE	114	190	25	64	19	152	19	6
102 DIA. STD. PIPE		140	216	25	90	19	178	19	6
127 DIA. STD. PIPE	16 DIA.x 89 32.5 N•m TORQUE	145	260	32	102	22	216	25	6
152 DIA. STD. PIPE		191	292	32	127	22	248	25	8
203 DIA. STD. PIPE		242	355	32	178	22	316	25	8

FUSE PLATE DATA TABLE

M	G	H	J	K	L	N	t_2	d_1	BOLT DIA.
98	57	28	60	38	11	13	6	14	13
98	57	28	70	38	16	13	8	14	13
112	64	32	86	50	18	16	10	14	13
112	64	32	92	50	21	16	10	17	16
112	64	32	102	58	22	16	11	21	20
133	76	38	102	58	22	19	10	21	20
136	76	38	146	96	25	22	10	24	22
136	76	38	146	96	25	22	11	24	22
136	76	38	146	96	25	22	13	24	22

NO FUSE PLATE REQUIRED ON PIPE COLUMN



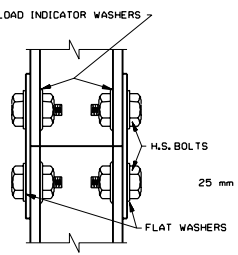
PLACE SIGN SUPPORT FOUNDATION SO IMPACTING VEHICLES DO NOT SNAG ON EITHER FOUNDATION OR ANY SUBSTANTIAL REMAINS OF SIGN SUPPORT. GRADE SURROUNDING TERRAIN TO PERMIT IMPACTING VEHICLES TO PASS OVER FOUNDATION AND PORTIONS OF SIGN SUPPORTS WHICH REMAIN IN THE GROUND OR ARE RIGIDLY ATTACHED TO THE FOUNDATION.

BREAKAWAY SUPPORT STUB

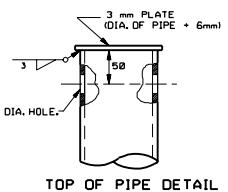
HEIGHT MEASUREMENT

NOTES:

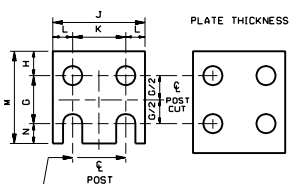
1. DESIGN SHALL CONFORM TO THE LATEST EDITION OF AASHTO STD. SPEC. FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS.
2. BASE, SLIP AND FUSE PLATES SHALL BE FABRICATED FROM STEEL MEETING THE REQUIREMENTS SPECIFIED FOR THE SIGN POST TO WHICH THEY ARE ATTACHED EXCEPT WHERE PIPE POST ARE USED. IN WHICH CASE THEY SHALL CONFORM TO THE REQUIREMENTS OF ASTM A 36.
3. STRUCTURAL STEEL SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO THE FOLLOWING A.S.T.M. DESIGNATIONS; STD. PIPE 75 mm - 200 mm DIA. ASTM A 53 GRADE "B". W & S SHAPES ASTM A 36M.
4. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A 325 AND SHALL BE CADMIUM ELECTRO PLATED CONFORMING TO ASTM A 165 NS.
5. WELDING SHALL CONFORM TO THE REQUIREMENTS OF THE AASHTO STD. SPECS. FOR WELDING OF STRUCTURAL STEEL HIGHWAY BRIDGES.
6. ALL PLATE CUTS SHALL PREFERABLY BE SAW CUTS, HOWEVER, FLAME CUTTING WILL BE PERMITTED PROVIDED ALL EDGES ARE GROUND. METAL PROJECTING BEYOND THE PLATE FACE WILL NOT BE TOLERATED.
7. ALL STRUCTURAL STEEL SHALL BE GALVANIZED AFTER FABRICATION IN CONFORMANCE TO AASHTO SPECIFICATION M-111 (ASTM A 123).
8. HIGH STRENGTH BOLTS IN THE BASE CONNECTION SHALL BE TIGHTENED ONLY TO THE TORQUE LIMITS SHOWN IN THE TABLE. DO NOT OVER TIGHTEN.
9. ALL HIGH STRENGTH FRICTION FUSE BOLTS SHALL BE TIGHTEND IN THE SHOP. USE DIRECT-TENSION INDICATOR WASHERS TO TIGHTEN THE BOLTS. SEE SECTION 510 OF THE SPECIFICATIONS.
10. ALL SIGNS DESIGNATED FOR MOUNTING WITH BREAKAWAY BASES ON UNDIVIDED HIGHWAYS OR ON DIVIDED HIGHWAYS OF LESS THAN FOUR LANES SHALL BE MOUNTED WITH BREAKAWAY PLATES PARALLEL TO THE BASE PLATES.



DETAIL "A" HINGE



TOP OF PIPE DETAIL

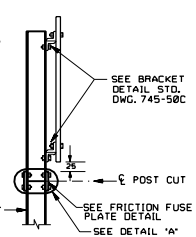


HOLE DIA.= d_1 USE H.S. BOLTS W/HEX HEAD AND NUT, ONE FLAT WASHER UNDER EACH BOLT HEAD AND BEVEL WASHER UNDER NUTS.

FACE PLATE

REAR PLATE

(USE SAME DIMENSIONS)



SIDE VIEW

FUSE PLATE DETAIL

(SEE TABLE FOR DIMENSIONS)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	12/15/98	G.S.	STEEL POST AND STUB POST ELEVATION AND BREAKAWAY HEIGHT MEASUREMENT
2	02/25/99	G.S.	REVISED DETAILS.
3	06/25/01	GFS	REVISED BREAKAWAY SUPPORT DETAIL.
4	11/27/01	F.L.	CHANGED SHEET TITLE.

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DATE: DEC.11,2001

CHAIRMAN STANDARDS COMMITTEE

APPROVED — DATE: DEC.11,2001

DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE

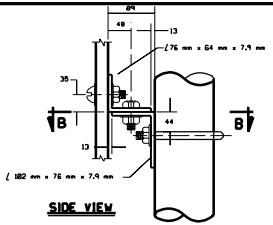
GROUND MOUNTED SIGNS INSTALLATION DETAILS

STD. DWG. NO.

745-50B

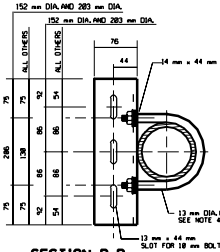
NOTES:

1. SEE STANDARD DRAWING 745-500 FOR GENERAL NOTES.
2. THE 6 mm R.H. MACHINE SCREWS AND WASHERS AND THE 9 mm BOLTS AND WASHERS USED IN THE SIGN FACE ARE TO BE 18-8 STAINLESS STEEL. ALL OTHER BOLTS, NUTS AND WASHERS SHALL BE CADMIUM ELECTROPLATED, CONFORMING TO ASTM B 766.
3. THE ENTIRE SIGN BRACING ASSEMBLY, STEEL SIGN POSTS AND U-BOLTS SHALL BE SHOP GALVANIZED TO MEET AASHTO SPECIFICATIONS M 111
4. U-BOLT SHALL MEET ASTM SPECIFICATION A 576, GRADE 1020 MERCHANT QUALITY.
5. BOTH 6 mm FLAT WASHERS AND 6 mm LOCK WASHERS SHALL BE USED ON ALL 6 mm R.H. SCREWS. USE LOCK WASHERS ON ALL BOLTS.

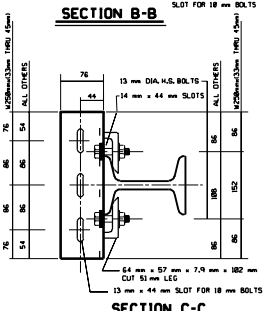


SIDE VIEW

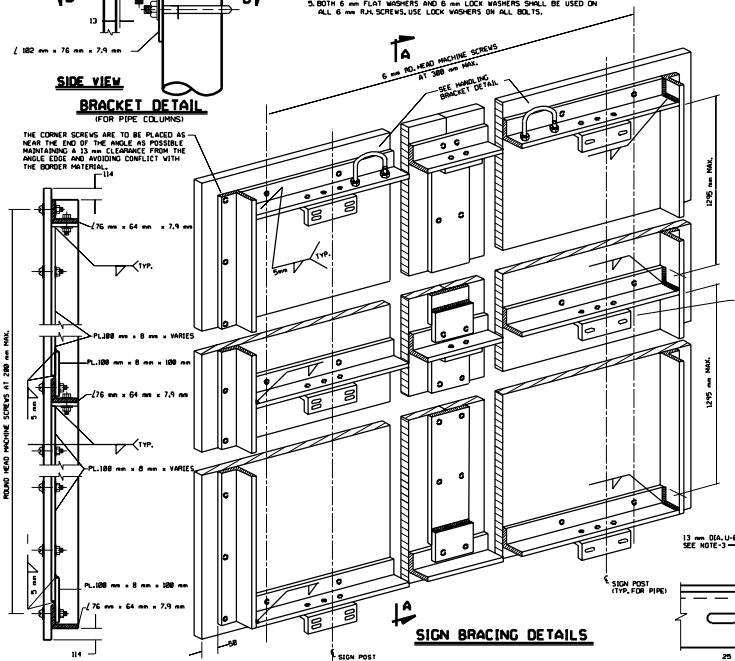
BRACKET DETAIL
(FOR PIPE COLUMNS)



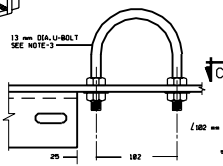
SECTION B-B



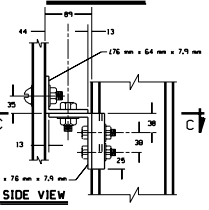
SECTION C-C



SIGN BRACING DETAILS



HANDLING BRACKET DETAIL



SIDE VIEW

BRACKET DETAIL
(FOR S OR W COLUMNS)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE SHOWN.

REVISIONS			
NO.	DATE	BY	REMARKS
1	JAN 22 1999	R.A.	DRAWING ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

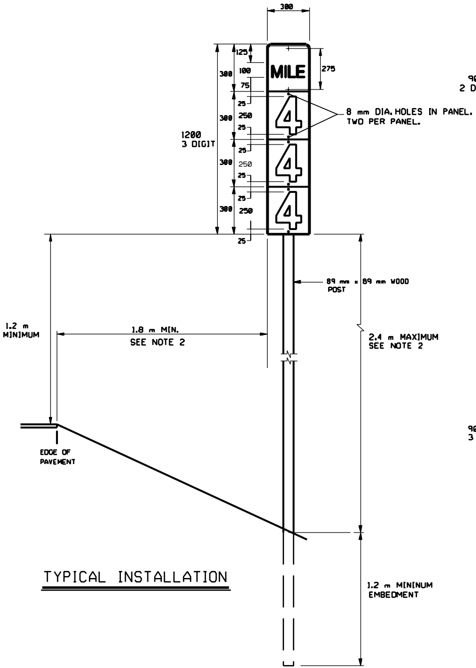
RECOMMENDED FOR APPROVAL: APR 22 1999 — DEPUTY DIRECTOR
CHAIRMAN STANDARDS COMMITTEE APPROVED: APR 22 1999 — DEPUTY DIRECTOR

(METRIC)

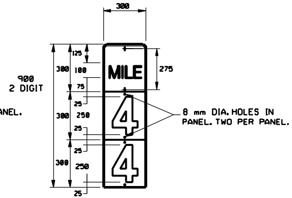
GROUND MOUNTED SIGNS INSTALLATION DETAILS

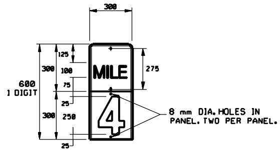
STANDARD DRAWING TITLE

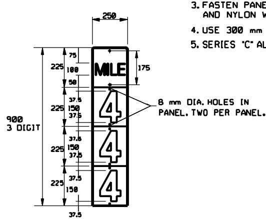
STD. DWG. NO.
745-50C



TYPICAL INSTALLATION







NOTES:

1. REFLECTORIZED WHITE LEGEND AND BORDER ON A REFLECTORIZED GREEN BACKGROUND. (MILEPOST SIGN)
2. OFFSET UP TO 6 m IS DESIRABLE, DO NOT EXCEED 2.4 m MOUNTING HEIGHT FROM BOTTOM OF SIGN TO THE GROUND WHILE MAINTAINING 1.2 m MINIMUM HEIGHT ABOVE PAVEMENT EDGE.
3. FASTEN PANEL TO WOOD POST WITH 6 mm x 38 mm LAG SCREW AND NYLON WASHER (6 I.D.).
4. USE 300 mm WIDE PANELS FOR INTERSTATE HIGHWAYS.
5. SERIES "C" ALPHABET STANDARD HIGHWAY SIGNS MANUAL.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	REMARKS
1	08/08/98	CORRECT ROUNDING ERROR IN 900 3 DIGIT DETAIL AND ADD NOTE 5.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

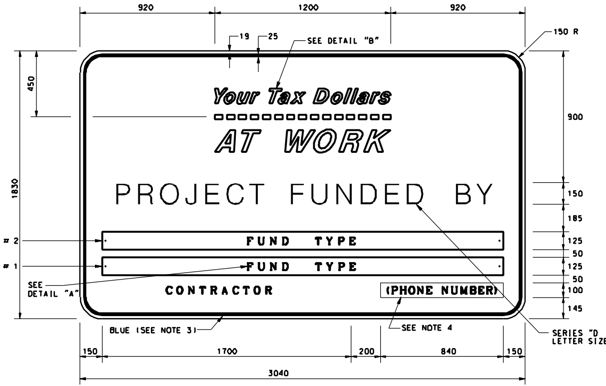
RECOMMENDED FOR APPROVAL — SEP.08,1998 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — SEP.08,1998 DATE
DEPUTY DIRECTOR

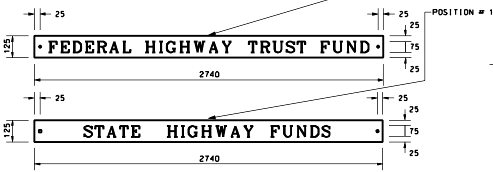
(METRIC)
TYPICAL INSTALLATION FOR MILEPOST SIGNS
STANDARD DRAWING TITLE

STD. DWG. NO.
745-51

NOTES

1. THE SIGN MESSAGE SHOWN FOR FUND TYPE IS AN EXAMPLE ONLY. USE ONE OF THE FOLLOWING ON THE ACTUAL SIGN. IF FEDERAL FUNDS ARE IDENTIFIED IN THE NOTICE TO CONTRACTORS USE THE PHRASE "FEDERAL HIGHWAY TRUST FUNDS." IF STATE FUNDS ARE IDENTIFIED, USE "STATE HIGHWAY FUNDS." THIS PORTION OF THE SIGN WILL BE REMOVABLE TO ALLOW USE OF THE SIGN ON FUTURE PROJECTS. SERIES "C" LETTER SIZE. IF BOTH FUND TYPES ARE SPECIFIED SEE DETAIL "A". IF ONLY ONE FUND USED, USE POSITION NUMBER "1"
2. EXCEPT AS OTHERWISE SHOWN, THE LEGEND OF THE SIGN SHALL BE BLACK ON A WHITE BACKGROUND (REFLECTIVE).
3. THE BORDER OF THE SIGN AND DETAIL "B" SHALL BE BLUE (REFLECTIVE).
4. REPLACE WITH THE CONTRACTOR'S PUBLIC INFORMATION OFFICE PHONE NUMBER. SERIES "C" LETTER SIZE.
5. REFER TO STD. DWG. 745-60 FOR SIGN INSTALLATION. USE 2-140 x 190 mm POSTS OR DEPARTMENT APPROVED EQUAL.





DETAIL "A"

(SEE NOTE 1)

DETAIL "B"

(SEE NOTE 3)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
1	08/03/99	B.A.	CHANGED FOR INFORMATION TO CONTRACTOR, STD. DWG. REDRAWN ORIGINAL DETAIL "B" AND NOTE 4 REMOVED, NOTES AND DETAILS RENUMBERED.
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — AUG.10,1999 DATE

APPROVED — DEPUTY DIRECTOR — AUG.10,1999 DATE

(METRIC)

PROJECT PUBLIC INFORMATION SERVICES SIGNS

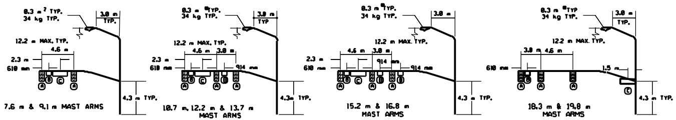
STANDARD DRAWING TITLE

STD. DWG. NO.

745-52

DESIGN INFORMATION

(SEE NOTE)



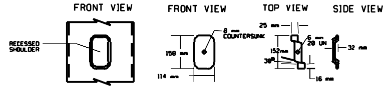
7.6 m & 9.1 m MAST ARMS

10.7 m, 12.2 m & 13.7 m MAST ARMS

15.2 m & 16.8 m MAST ARMS

18.3 m & 19.8 m MAST ARMS

DEVICE	DESCRIPTION	PROJ.- AREA (m²)	WEIGHT (kg)
(A) SIGNAL	305 mm SECTION WITH 152 mm BACK PLATE	0.92 m²	25 kg
(B) SIGN	REGULATORY 610 mm x 762 mm	0.46 m²	9 kg
(C) SIGN	STREET NAME 406 mm x 2.4 m	0.98 m²	20 kg



FLUSH HAND HOLE CASTING DETAIL

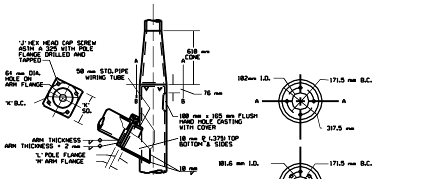
FLUSH HAND HOLE COVER

HAND HOLE COVER LATCH

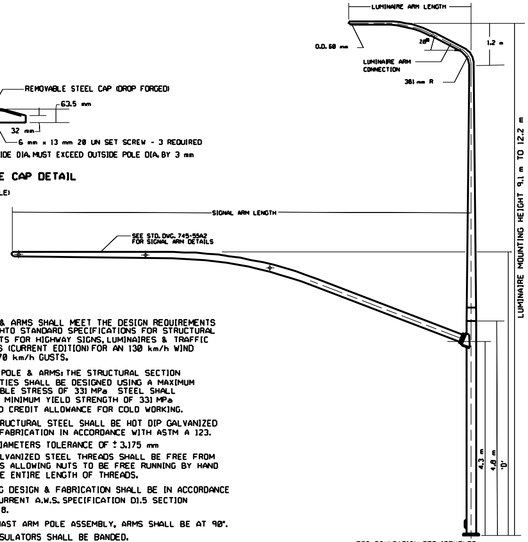
ATTACH LATCH & COVER TOGETHER WITH 6 mm x 50 mm UN FLAT HEAD BOLT. END OF BOLT TO BE PEENED.

STEEL POLE CAP DETAIL

(REMOVABLE)



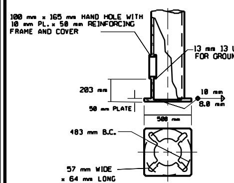
SIGNAL ARM CONNECTION



FOR FOUNDATION REQUIREMENTS SEE STANDARD DRAWING 745-55C

NOTE:

1. POLES & ARMS SHALL MEET THE DESIGN REQUIREMENTS OF AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES & TRAFFIC SIGNALS (CURRENT EDITION) FOR AN 130 km/h WIND WITH 170 km/h GUSTS.
2. STEEL POLE & ARMS: THE STRUCTURAL SECTION PROPERTIES SHALL BE DESIGNED USING A MAXIMUM ALLOWABLE STRESS OF 331 MPa STEEL SHALL HAVE A MINIMUM YIELD STRENGTH OF 331 MPa WITH NO CREDIT ALLOWANCE FOR COLD WORKING.
3. ALL STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.
4. TUBE DIAMETERS TOLERANCE OF ± 3.175 mm
5. ALL GALVANIZED STEEL THREADS SHALL BE FREE FROM DEFECTS ALLOWING NUTS TO BE FREE RUNNING BY HAND FOR THE ENTIRE LENGTH OF THREADS.
6. WELDING DESIGN & FABRICATION SHALL BE IN ACCORDANCE WITH CURRENT A.W.S. SPECIFICATION D1.5 SECTION 1 THRU 8.
7. DUAL MAST ARM POLE ASSEMBLY, ARMS SHALL BE AT 90°.
8. ALL INSULATORS SHALL BE BANDED.
9. POLES & ARMS SHALL BE CIRCULAR CROSS SECTIONS.



BASE DETAIL

ARM LENGTH	D	J	K	L	M
7.6 m to 13.7 m	6.2 m	32 mm - 7 NC x 75 mm	356 mm	38 mm	32 mm
15.2 m to 19.8 m	6.4 m	38 mm - 6 NC x 100 mm	406 mm	50 mm	50 mm

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE		APPR.
1	04/22/99	B.A. DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.	

REMARKS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.22,1999 DATE

CHAIRMAN STANDARDS COMMITTEE

APPROVED — APR.22,1999 DATE

DEPUTY DIRECTOR

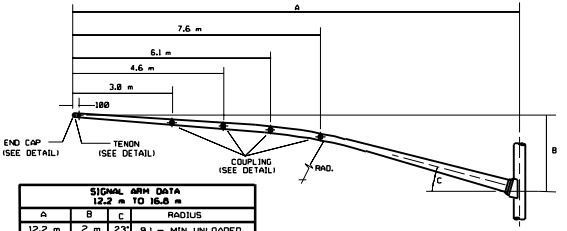
(METRIC)

TRAFFIC SIGNALS MAST ARM POLE AND LUMINARE EXTENSION

STANDARD DRAWING TITLE

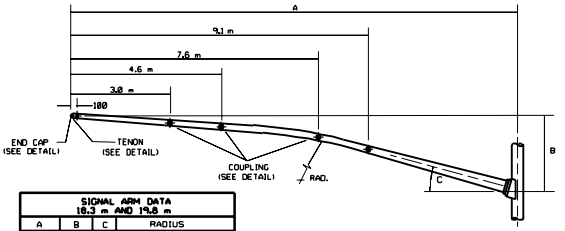
STD. DWG. NO.

745-55A1



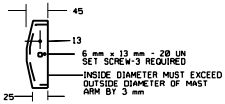
SIGNAL ARM DATA
12.2 m TO 16.8 m

A	B	C	RADIUS
12.2 m	2 m	23°	9.1 m MIN. UNLOADED
13.7 m	2 m	23°	9.1 m MIN. UNLOADED
15.2 m	2.1 m	15°	21.3 m MIN. UNLOADED
16.8 m	2.1 m	15°	21.3 m MIN. UNLOADED

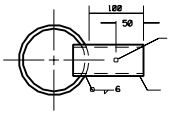


SIGNAL ARM DATA
18.3 m AND 19.8 m

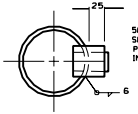
A	B	C	RADIUS
18.3 m	2.1 m	15°	21.3 m MIN. UNLOADED
19.8 m	2.1 m	15°	21.3 m MIN. UNLOADED



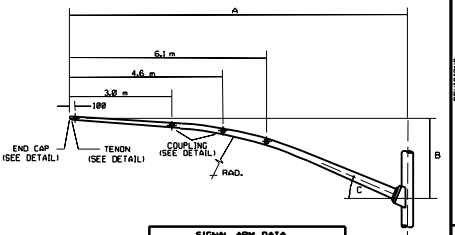
MAST ARM END CAP DETAIL
OR APPROVED EQUAL
(REMOVABLE)



TENON DETAIL



COUPLING DETAIL



SIGNAL ARM DATA
7.6 m TO 10.7 m

A	B	C	RADIUS
7.6 m	2 m	23°	9.1 m MIN. UNLOADED
9.1 m	2 m	23°	9.1 m MIN. UNLOADED
10.7 m	2 m	23°	9.1 m MIN. UNLOADED

NOTES: CONTINUED FROM 745-55A1

10. COUPLING & TENON DETAILS SHALL BE DIMENSIONED AS SHOWN, SUBSTITUTIONS WILL NOT BE ALLOWED.
11. SHOP DRAWINGS ARE REQUIRED.
12. UNLOADED - NO DEAD OR LIVE LOAD.
13. ALL BUTT OR GROOVE WELDS SHALL BE GROUND FLUSH.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	8/27/98	B.A.	CORRECT NOTE REFERENCE
2	08/28/08	T.M.	CHANGED THE DIMENSION IN THE TITLE BLOCK FROM 18.8 m TO 19.8 m.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — DATE NOV.14.2008

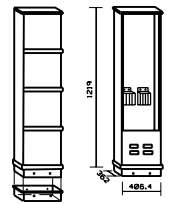
APPROVED

DEPUTY DIRECTOR — DATE NOV.14.2008

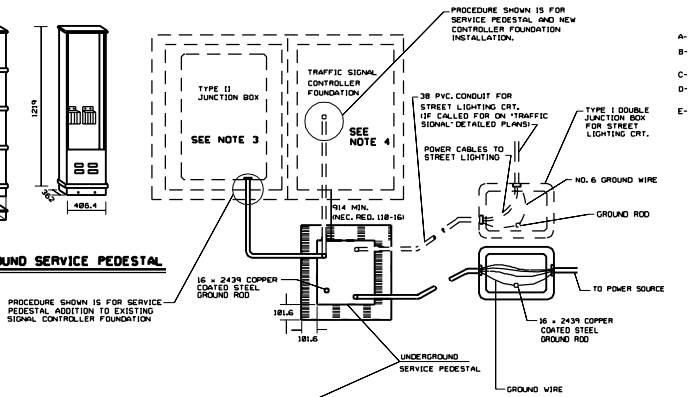
(METRIC)
TRAFFIC SIGNALS
MAST ARM DETAIL
7.6 m THRU 19.8 m

STANDARD DRAWING TITLE

STD. DWG. NO.
745-55A2



UNDERGROUND SERVICE PEDESTAL



UNDERGROUND SERVICE PEDESTAL

A- RATED 100 AMP AT 120/240 VAC.

B- BOTH METERED AND UN-METERED CIRCUIT BREAKER INTERIORS SHALL PROVIDE FOR SIX FULL 25.4 mm POLES (INCLUDING MAINS).

C- INTERIORS SHALL ACCEPT PLUG-IN CIRCUIT BREAKERS.

D- BASE SHALL BE DETACHABLE FOR PRE-INSTALLATION IN CONCRETE FOUNDATION.

E- SECURE PIANO HINGED DOORS WITH MASTER PADLOCK NO. P-848.

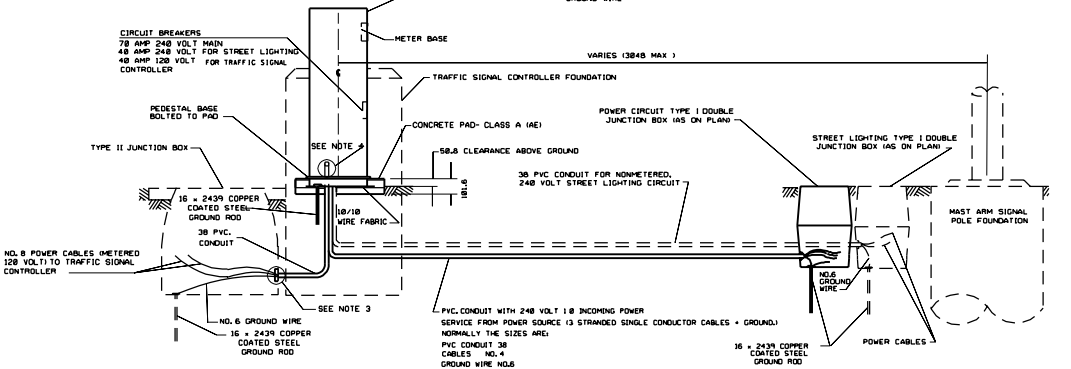
NOTES:

1. SERVICE PEDESTAL LOCATION MAY BE ADJACENT TO TYPE II JUNCTION BOX, ON EITHER SIDE OR BACK OF CONTROLLER FOUNDATION TO TAKE ADVANTAGE OF FIELD CONDITIONS. EXACT POSITION SHALL BE DETERMINED BY THE PROJECT ENGINEER.

2- METER SOCKET WITH TEST BLOCKS (SAFETY SOCKET,REQUIRED CIRCUIT BREAKERS, CONCRETE PAD, ALL PVC. CONDUIT FOR CONTROLLER POWER, GROUNDING AND GROUND ROD, NO. 8 POWER CABLES FROM SERVICE PEDESTAL TO SIGNAL CONTROLLER POWER INPUT, SHALL BE INCLUDED IN THE ITEM FOR "UNDERGROUND SERVICE PEDESTAL".

3- INSTALLATION OF UNDERGROUND SERVICE PEDESTAL AT EXISTING CONTROLLER FOUNDATION REQUIRE THAT THE 38 CONDUIT WITH THE 120 VOLT, NO. 8 POWER CABLES FOR CONTROLLER POWER BE ROUTED TO THE TYPE II JUNCTION BOX AS SHOWN.

4- INSTALLATION OF UNDERGROUND SERVICE PEDESTAL AND NEW CONTROLLER FOUNDATION REQUIRES THAT THE 38 CONDUIT WITH THE 120 VOLT, NO. 8 POWER CABLES FOR CONTROLLER POWER BE INSTALLED THROUGH THE CONTROLLER FOUNDATION DIRECTLY TO THE CONTROLLER CABINET.



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

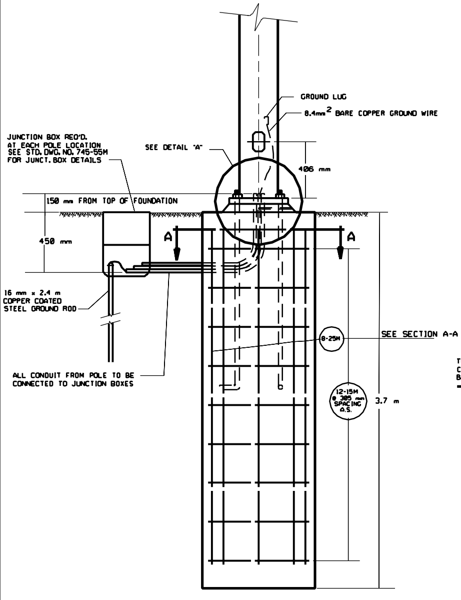
RECOMMENDED FOR APPROVAL: CHAIRMAN STANDARDS COMMITTEE — DATE
APPROVED: DEPUTY DIRECTOR — DATE

(METRIC)
STANDARD DRAWING TITLE
UNDERGROUND SERVICE PEDESTAL DETAILS

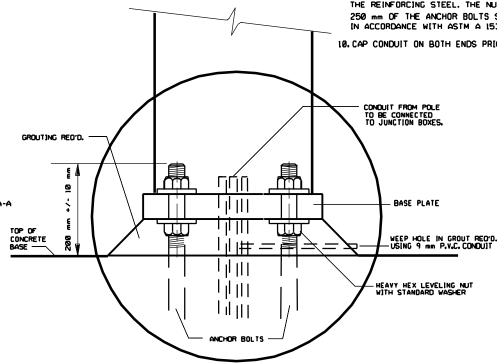
STD. DWG. NO.
745-558

NOTE:

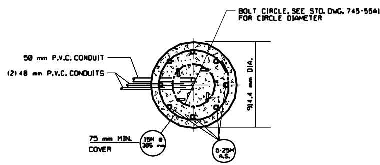
1. INSTALL SIGNAL POLE FOUNDATION TO ACHIEVE A MINIMUM 5.3 m CLEARANCE AND MAXIMUM 5.8 m CLEARANCE FROM BOTTOM OF SIGNAL HEAD.
2. ALL FOUNDATIONS SHALL BE CAST IN PLACE AGAINST UNDISTURBED EARTH. WELDING OF REINFORCING STEEL PROHIBITED.
3. A CIRCULAR FORM SHALL BE USED FOR THE TOP 450 mm ONLY.
4. BOLTS TO BE SQUARE WITH ROADWAY OR AT ANGLE SHOWN ON PLANS.
5. PLACE ALL CONDUIT IN SAME TRENCH WHERE POSSIBLE.
6. ALL FOUNDATIONS SHALL BE 900 mm x 3.7 m DEEP.
7. CONCRETE FOR FOUNDATION SHALL BE CLASS 'A' (AE).
8. SET BOTTOM OF SHAFT AT THE SAME ELEVATION AS:
   TOP OF CURB - WITH CURB AND GUTTER
   CROWN OF THE ROAD - IF NO CURB AND GUTTER
9. ANCHOR BOLTS SHALL CONFORM TO MINIMUM REQUIREMENTS OF ASTM A 307. ANCHOR BOLT SHALL NOT BE WELDED TO THE REINFORCING STEEL. THE NUTS, WASHERS & THE TOP 250 mm OF THE ANCHOR BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A 153.
10. CAP CONDUIT ON BOTH ENDS PRIOR TO INSTALLATION.



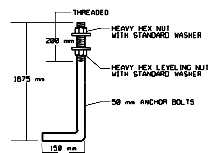
POLE FOUNDATION



DETAIL "A"



SECTION A-A



M50 ANCHOR BOLT
ASSEMBLY
(4 REQUIRED)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.
2	11/02/00	H.D.	ADDED NOTE 1, RENUMBERED ORIGINAL NOTES AND REVISED DETAIL A AND POLE FOUNDATION DETAIL.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

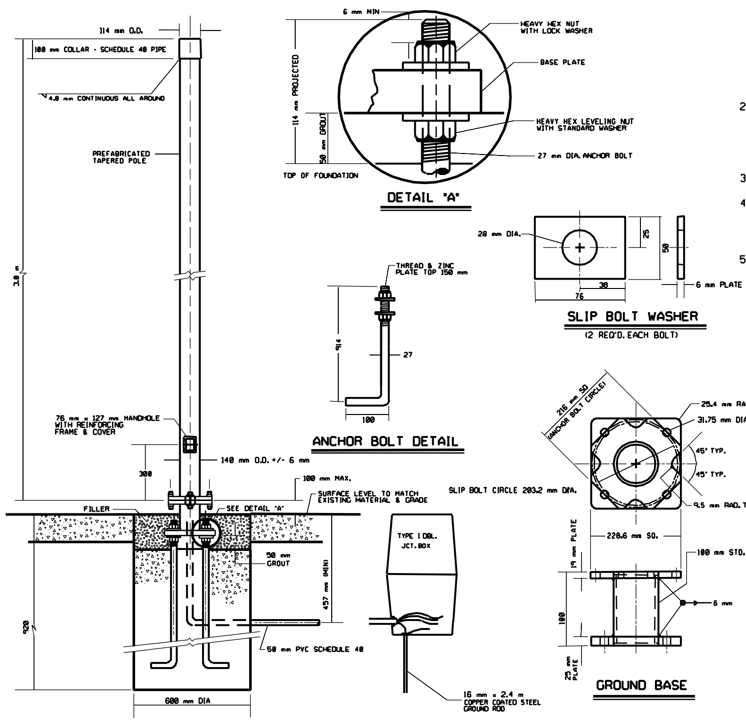
RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — NOV.14.2000 DATE

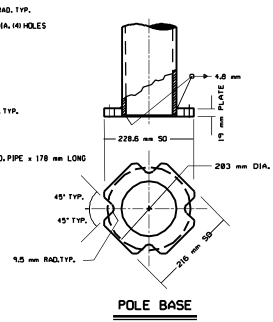
APPROVED — DEPUTY DIRECTOR — NOV.14.2000 DATE

(METRIC)
TRAFFIC SIGNALS
MAST ARM
POLE FOUNDATION

STANDARD DRAWING TITLE

STD. DWG. NO.
745-55C





GENERAL NOTES

1 - POLE

TAPERED STEEL POLE SHALL MEET SPECIFICATIONS ASTM A 570 GRADE C, GALVANIZED AASHTO M 111 (ASTM A 123).
POLES SHALL MEET THE REQUIREMENTS OF AASHTO "STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES & TRAFFIC SIGNALS", CURRENT EDITION, FOR AN 130 km/h WIND WITH 170 km/h GUSTS.
ALLOWABLE STRESSES:

ASTM A 570 GRADE C-F_b = 150.17 MPa (.66 Fy)
F_v = 75.08 MPa (.33 Fy)
INCREASE 40% FOR GROUP II & GROUP III LOADING.

2 - ANCHOR BOLTS

ANCHOR BOLTS CONFORMING TO ASTM A 307 MAY BE FURNISHED EITHER HOOKED AS SHOWN OR WITH A REGULAR SQUARE HEAD & 13 mm x 76 mm x 76 mm PLATE WASHER TACK WELDED TO BOLT HEAD.
EXPOSED PORTIONS OF ANCHOR BOLTS SHALL BE ZINC PLATED IN ACCORDANCE WITH ASTM A 153 NS.
ANCHOR BOLTS SHALL NOT BE WELDED TO REINFORCING STEEL.

3 - FOUNDATION

THE FOUNDATION SHALL BE CAST-IN-PLACE CLASS A (AE) CONCRETE.

4 - SLIP BOLTS

ALL SLIP BOLTS SHALL BE 16 mm x 76 mm ASTM A 325 & SHALL BE ZINC PLATED.
EACH SLIP BOLT SHALL BE TORQUED TO 109 N•m, RELEASED & THEN RETORQUED TO 95 N•m.

5 - CONDUITS

CONDUIT TO BE CAPPED ON BOTH ENDS PRIOR TO POUR.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.

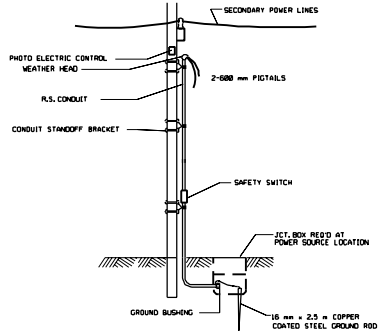
REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

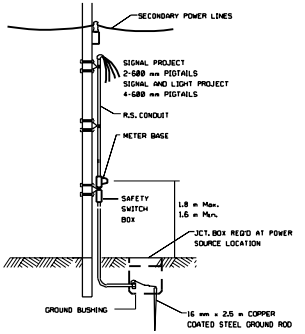
RECOMMENDED FOR APPROVAL — APR.22,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.22,1999 DATE
DEPUTY DIRECTOR

(METRIC)
BREAKAWAY POST MOUNTED TRAFFIC SIGNAL POLE
STANDARD DRAWING TITLE

STD. DWG. NO.
745-550



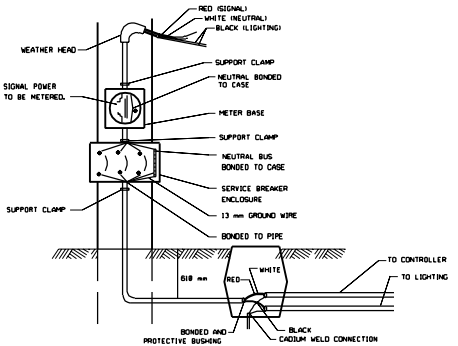
STREET LIGHTING POWER SOURCE



SIGNAL AND LIGHTING POWER SOURCE

NOTES:

1. STREET LIGHTING CIRCUIT REQUIRES DUAL 20 AMP CIRCUIT BREAKER SUITABLE FOR USE ON SERVICE EQUIPMENT.
2. SIGNAL CIRCUIT REQUIRES 40 AMP CIRCUIT BREAKER SUITABLE FOR USE ON SERVICE EQUIPMENT.
3. ALL CONDUCTORS TO BE SINGLE CONDUCTOR COPPER CABLE NO. 6 AWG TYPE RHH-USE-RHW.
4. METER BASE SHALL BE EUSERC APPROVED CLAMP-JAW BY-PASS RELEASE METER SOCKET. (REQ. ON SIGNAL PROJECTS ONLY)
5. SAFETY SWITCH BOX SHALL BE A 3-POLE NEMA TYPE 3R AND SUPPLIED WITH A MASTER PADLOCK NO. P-848.
6. ALL CONDUIT SHALL BE PLACED IN THE SAME TRENCH WHERE POSSIBLE.
7. CONTRACTOR SHALL FURNISH AND INSTALL AS SHOWN. POWER CONNECTION BY OTHERS.
8. GROUND WIRE SHALL BE No.6 BARE COPPER GROUND WIRE.



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	BY	REMARKS
1	04/27/01	S.A.	DRAWING ELECTRONICALLY CHANGED, NO CHANGE IN CONTENT.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: APR. 22, 1999 DATE

CHAIRMAN STANDARDS COMMITTEE

APPROVED: APR. 22, 1999 DATE

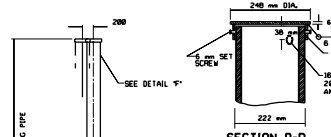
DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE

POWER SOURCE DETAILS

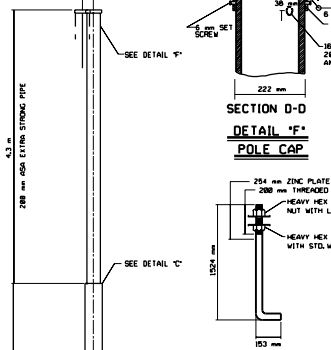
STD. DWG. NO.
745-55E



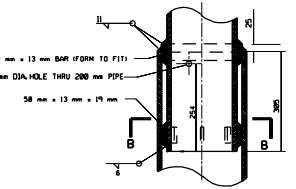
SECTION D-D

DETAIL "F"

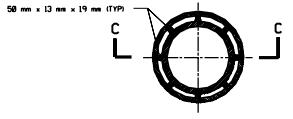
POLE CAP



ANCHOR BOLT



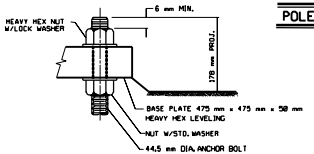
SECTION C-C



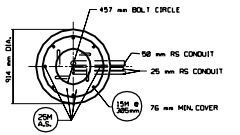
SECTION B-B

DETAIL "C"

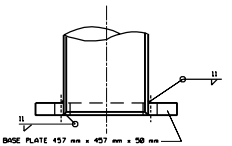
POLE SPLICE



DETAIL "B"

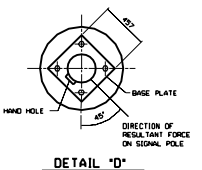


SECTION A-A



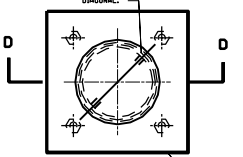
DETAIL "E"

BASE PLATE



DETAIL "D"

ANCHOR BOLT LOCATION



PLAN VIEW

NOTES:

1. THE POLE IS DESIGNED PRIMARILY FOR THE USE OF STEEL MEETING SPECIFICATIONS ASTM A 53, GRADE B. OTHER POLE MATERIALS AND DESIGNS MAY BE ACCEPTABLE SUBJECT TO THE APPROVAL OF DESIGN AND DRAWINGS BY THE CHIEF STRUCTURAL ENGINEER PRIOR TO THE OPENING OF BIDS.
   POLES SHALL MEET THE REQUIREMENTS OF "STD. SPECS. FOR STR. SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS" 1994 ED. FOR AN 130 km/h WIND WITH 170 km/h GUSTS.
   ALLOWABLE STRESS: ASTM A 53 GRADE B $F_b = 165.5 MPa (0.66\ F_y)$
   BASIC SIGNAL POLE DESIGN UTILIZED SHALL BE THE SAME FOR ALL POLES THROUGHOUT THE PROJECT.
   EACH POLE SHALL BE RAKED 200 mm OPPOSITE THE DIRECTION OF EACH SINGLE PULL.
   THE POLE CAP, BASE PLATE AND SPLICE MATERIALS SHALL BE FABRICATED FROM ASTM A 36 STEEL.
   ALL STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123
2. ANCHOR BOLTS
   ANCHOR BOLTS CONFORMING TO ASTM A 307 MAY BE FURNISHED EITHER HOOKED AS SHOWN OR WITH A REGULAR SQUARE HEAD AND 19 mm x 127 mm x 127 mm PLATE WASHER TACK WELDED TO BOLT HEAD.
3. FOUNDATION
   ALL FOUNDATIONS SHALL BE CAST IN PLACE IN AUGERED HOLE AND SHALL BE CLASS A (AE) CONCRETE.
4. SHOP DRAWINGS
   SHOP DRAWINGS ARE REQUIRED IN ACCORDANCE WITH "STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION."
5. CONDUIT
   PLACE ALL CONDUIT IN SAME TRENCH WHEN AND WHERE POSSIBLE.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO	DATE	REMARKS
1	04/22/1999	S.A. DRAWING ELECTRONICALLY CHANGED, NO CHANGE IN CONCEPT.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

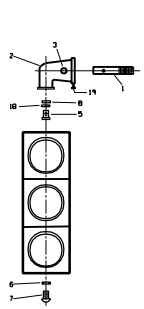
RECOMMENDED FOR APPROVAL: APR.23,1999
CHAIRMAN, STANDARDS COMMITTEE — DATE
APPROVED: APR.22,1999
DEPUTY DIRECTOR — DATE

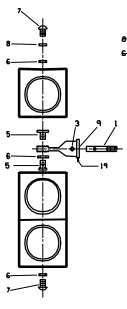
(METRIC)

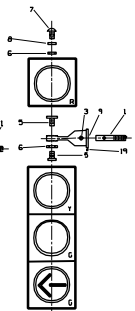
SPAN WIRE SIGNAL POLE DETAIL

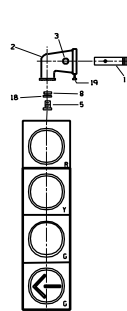
STANDARD DRAWING TITLE

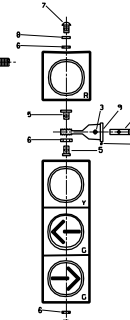
STD. DWG. NO.
745-55F

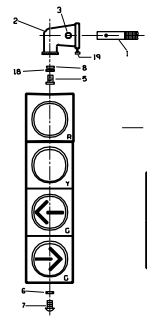


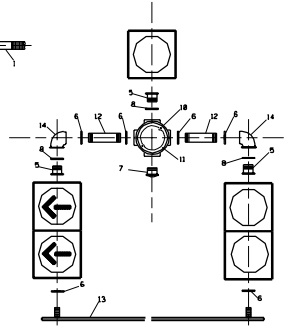


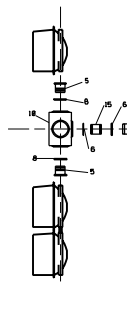




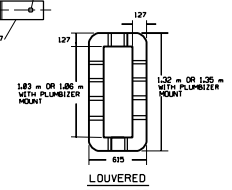




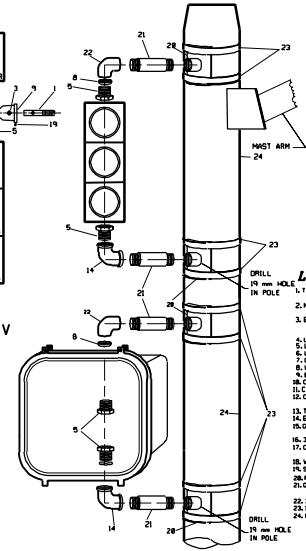




NOTE:FINISH IS FLAT BLACK



LOUVERED BACKPLATE DETAIL



LEGEND:

1. TENON, 58 mm GALV. STEEL PIPE THREADED ONE END.
2. MAST ARM PLUMBIZER, 38 mm I.D. THREADED WITH 54 mm I.D. FOR TENON (BRONZE ONLY).
3. BOLT, 8 mm X 100 mm STAINLESS STEEL OR ZINC PLATED WITH DOUBLE HEX NUTS, TWO STAINLESS STEEL WASHERS AND ONE LOCK WASHER.
4. LOCK NUT, 64 mm.
5. LOCK NIPPLE, 38 mm x 45 mm.
6. LOCK NUT, 38 mm.
7. ORNAMENTAL CAP, LONG.
8. WASHER, STAINLESS STEEL.
9. ELEVATOR PLUMBIZER, BRONZE.
10. CENTER HUB W/COVER PLATE 4 WAY.
11. CONC GASKET FOR CENTER HUB.
12. GALVANIZED PIPE, 38 mm X 127 mm THREADED BOTH ENDS.
13. TIE BRACE, 2 WAY.
14. ELBOW, 90°, 38 mm SERRATED.
15. GALVANIZED PIPE 38 mm X 58 mm THREADED BOTH ENDS.
16. 38 mm X 64 mm REDUCER.
17. GALVANIZED PIPE 64 mm X 150 mm THREADED ONE END.
18. WASHER, SHAKEPROOF, ZINC PLATED.
19. SET SCREWS, 3 REQUIRED.
20. ROUND POLE PLATE.
21. GALVANIZED PIPE 38 mm x 305 mm THREADED BOTH ENDS.
22. 38 mm PLAIN ELBOW.
23. 19 mm STAINLESS STEEL BAND 2 WRAPS.
24. POLE SHAFT.

NOTES:

A. VISORS FOR TRAFFIC SIGNALS SHALL BE THE TUNNEL TYPE 305 mm x 185 mm AND YELLOW IN COLOR.

B. SHOP DRAWINGS ARE REQ'D. IN ACCORDANCE WITH SUBSECTION 638.2.5 OF THE STATE OF UTAH "SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION" 1994 EDITION.

C. ALL FITTING TO BE BRONZE EXCEPT GALVANIZED STEEL PIPE FITTINGS.

D. TERMINAL BLOCK SHALL BE LOCATED IN TOP SECTION

E. TYPE V SIGNAL ASSEMBLIES SHALL BE INSTALLED SO THAT HINGED SIGNAL FACES SWING OPEN TO THE OUTSIDE.

F. ALL LENSES ORIENTED FOR TOP UPWARD ALIGHMENT.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS
1	04/22/1999	M.A.	DRAWING ELECTRONICALLY ENHANCED NO CHANGE IN CONCEPT

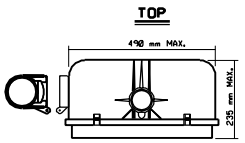
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: APPR. 22 APR 1999
CHAIRMAN STANDARDS COMMITTEE
APPROVED: APPR. 22 APR 1999
DEPUTY DIRECTOR — DATE

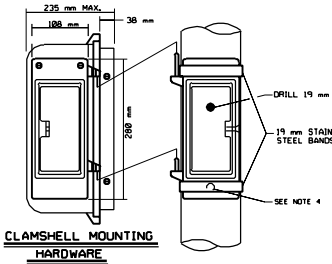
(METRIC)

STANDARD DRAWING TITLE
SIGNAL HEAD DETAILS

STD. DWG. NO.
745-55G

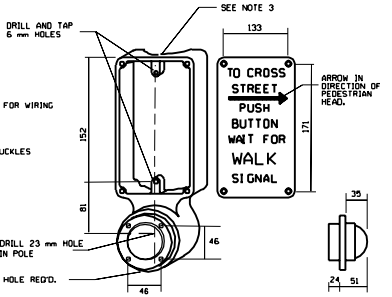


CLAMSHELL MOUNTING



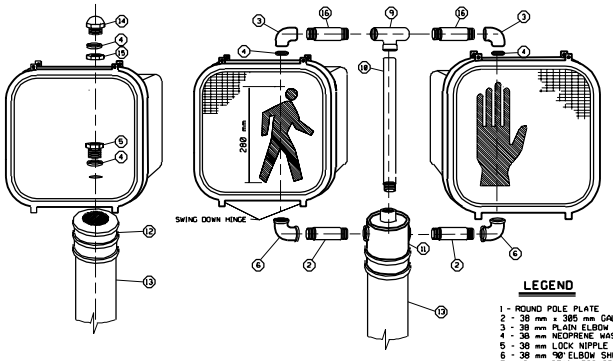
CLAMSHELL MOUNTING HARDWARE

OPEN VIEW

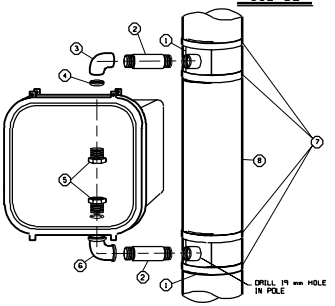


PUSH BUTTON ASSEMBLY

FRONT



PIPE MOUNTING



LEGEND

1 - ROUND POLE PLATE
2 - 38 mm x 305 mm GALV. PIPE, THREAD BOTH ENDS
3 - 38 mm PLAIN ELBOW
4 - 38 mm NEOPRENE WASHER
5 - 38 mm LOCK NIPPLE
6 - 38 mm 90° ELBOW SHURLOCK DEVICE SERRATED, 72 TEETH
7 - 19 mm STAINLESS STEEL BAND, 2 WRAPS
8 - POLE SHAFT (MAST ARM)
9 - 38 mm TEE WITH SET SCREW
10 - 38 mm GALV. PIPE, THREAD ONE END ONLY
11 - 114.3 mm INSIDE DIA. POLE TOP MOUNTED TERMINAL COLLAR
12 - 114.3 mm INSIDE DIA. ADAPTER WITH SERRATED PORTS
13 - 100 mm GALV. PIPE SHAFT
14 - 38 mm ORNAMENTAL CAP
15 - 38 mm LOCK NUT
16 - 38 mm GALV. PIPE, THREAD BOTH ENDS, CUT TO SIZE

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NOTES:

1 - MOUNTING HEIGHT OF PEDESTRIAN SIGNALS 2.5 m - 3 m TO BOTTOM OF HOUSING.
2 - MOUNT PUSH BUTTONS 1.1 m TO 1.2 m ABOVE GROUND OR SIDEWALK SURFACE.
3 - RADIUS TO MATCH POLE OR BE ADJUSTABLE.
4 - DRILL 13 mm MOUNTING HOLE AND ATTACH TO POLE WITH 12 mm BOLT (REQUIRED ON NON-TAPERED POLES ONLY).

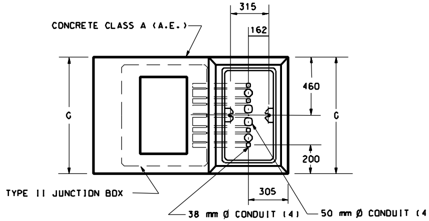
NO.	DATE	REMARKS
1	8-27-98	B.A. DRAWING ELECTRONICALLY, ENHANCED NO CHANGE IN CONCEPT

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

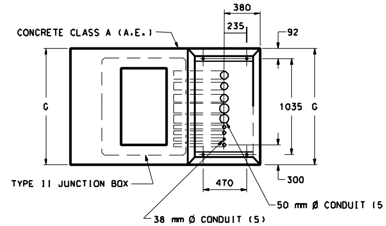
RECOMMENDED FOR APPROVAL — APR 22 1999 DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED — APR 22 1999 DATE
DEPUTY DIRECTOR

(METRIC)
PEDESTRIAN SIGNAL ASSEMBLY
STANDARD DRAWING TITLE

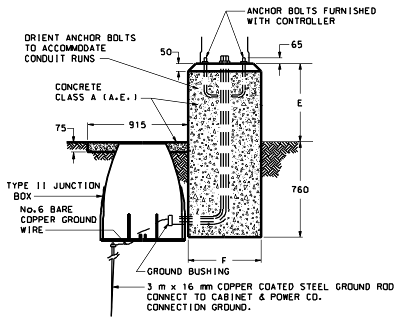
STD. DWG. NO.
745-55J

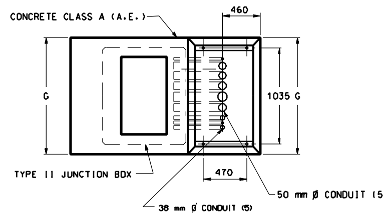


TYPE "M" CABINET BASE



TYPE "P-1" CABINET BASE





TYPE "R-1" CABINET BASE

NOTE: THE ABOVE PROFILE DRAWING IS TYPICAL OF THE TYPE "M", TYPE "P-1" AND TYPE "R-1" CABINET BASE.

CABINET	E	F	G
"M"	560	610	915
"P-1"	560	765	1220
"R-1"	560	915	1220

NOTES:

1. THE GROUNDED SIDE OF THE POWER SUPPLY SHALL BE GROUNDED TO THE CONTROL CABINET GROUND TERMINAL.
2. ALL WIRING SHALL BE NEAT AND FIRM.
3. 26 mm MIN. SPACING BETWEEN CONDUIT IN CABINET BASE. CONDUIT MUST BE CAPPED AT BOTH ENDS UNTIL USED.
4. ALL FIELD TERMINALS SHALL BE SUITABLY IDENTIFED.
5. IF PVC CONDUITS ALLOWED, CABINET MUST BE GROUNDED WITH 3 m x 16 mm COPPER COATED STEEL GROUND ROD.
6. ALL CONDUIT SHALL BE PLACED IN SAME TRENCH WHERE POSSIBLE.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	REMARKS	APPR.
1	05/12/98	CORRECTED ERROR IN DIMENSION FOR CONDUIT SIZE IN THREE PLACES.	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAY 12 1998 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — MAY 12 1998 DATE

DEPUTY DIRECTOR

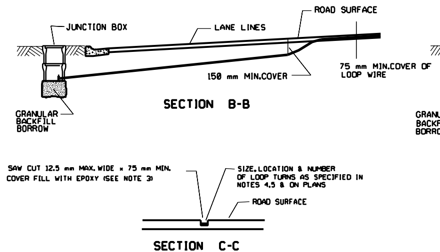
(METRIC)
CONTROLLER BASE DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
745-55K

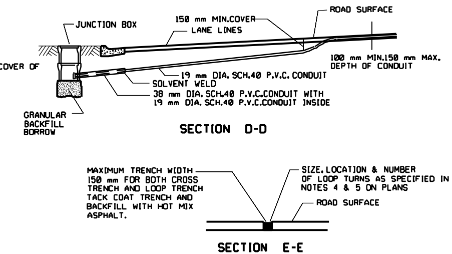
SAW CUT DETAIL

(CONCRETE)



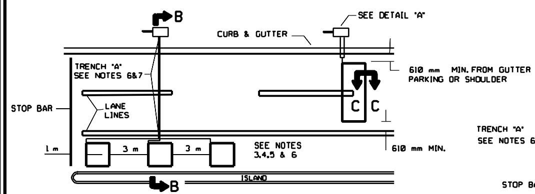
P.V.C DETAIL

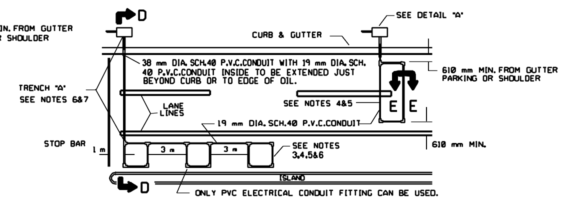
(ASPHALT)

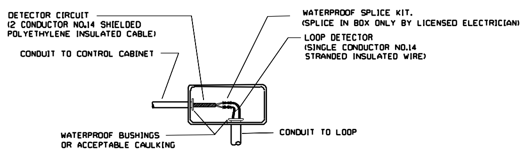


NOTES:

1. MATERIAL REMOVED TO PLACE DETECTOR MUST BE REPLACED BY SPECIFIED MATERIAL WITHIN 8 HOURS.
2. PLACE ALL CONDUIT IN SAME TRENCH WHERE POSSIBLE.
3. PLACE ALL CONDUCTORS IN SAW CUT CABLE OR WIRE MUST BE PLACED AT BOTTOM OF DRY SLOT. EPOXY SEAL NOT CONTAINING ACETANE SOLVENT SHALL BE USED TO CLOSE SAW CUT.
4. ADD ALL LOOPS 1.8 m x 3.6 m AND SMALLER SHALL HAVE 4 TURNS OF SINGLE CONDUCTOR #14 CABLE. ALL LOOPS 1.8 m x 4.2 m AND LARGER SHALL HAVE 3 TURNS.
5. DETECTOR LOOP STATION AND OFFSET SHOWN ON PLANS INDICATE LOOP CENTER.
6. LOOP DETECTOR SHALL HAVE SEPARATE WIRE FROM LOOP TO JUNCTION BOX. EACH LOOP SHALL BE TAGGED. LOOP DETECTOR WIRE SHALL BE PLACED COUNTER CLOCKWISE.
7. LOOP DETECTOR IN TRENCH "A" SHALL HAVE THREE TWISTS PER METER IN SAW CUT AND 10 TWISTS PER METER IN CONDUIT.
8. DETAIL TO BE USED AS INDICATED ON PLANS.
9. ALL LOOPS MUST BE INSPECTED AND TESTED. RESISTENCE TO GROUND MUST BE GREATER THAN 200 MILLION ohms AT 600 volts. SERIES RESISTENCE IS NOT TO EXCEED 0.8 ohms.







DETAIL "A"

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.
2	09/07/00	FRW	CHANGE TRENCH WIDTH IN SECTION E-E AND CORRECTED GRANULAR BACKFILL BORROW IN SECTION C-C

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE APPROVED — NOV.14,2000 DATE

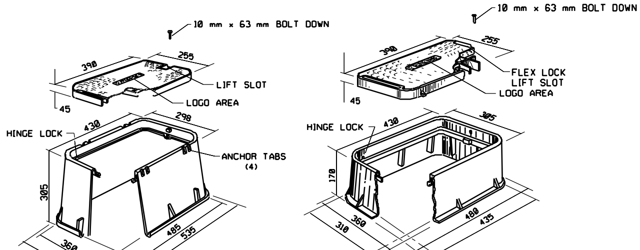
DEPUTY DIRECTOR — NOV.14,2000 DATE

(METRIC)

TRAFFIC SIGNALS
LOOP DETECTOR
DETAIL

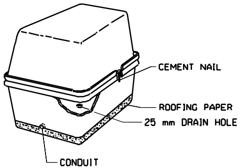
STANDARD DRAWING TITLE

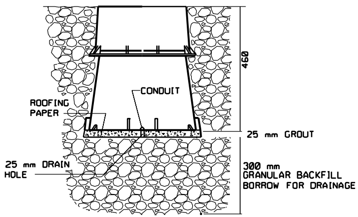
STD. DWG. NO.
745-55L



TYPE I

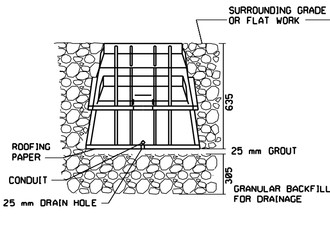
JUNCTION BOX





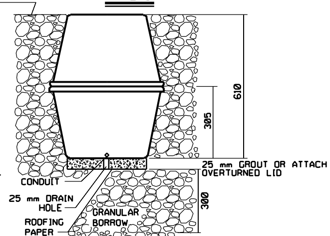
JUNCTION BOX AND EXTENSION

TYPE I



DOUBLE JUNCTION BOX

TYPE II



DOUBLE JUNCTION BOX

TYPE I

NOTES:

1. PROVIDE SEALING COMPOUND ON ENDS OF EACH CONDUIT RUN.
2. OTHER JUNCTION BOXES ACCEPTABLE SUBJECT TO APPROVAL BY THE ENGINEER.
3. USE GRANULAR BACKFILL WELL TAMPED AROUND JUNCTION BOXES.
4. CAST CONDUIT HOLES IN JUNCTION BOX AT THE TIME OF PRECASTING OR DRILL AT THE TIME OF PLACEMENT WITH NO STRUCTURAL DAMAGE TO BOX. ALL DRILLED HOLES SHALL BE THE SAME DIAMETER AS OUTSIDE DIAMETER OF CONDUIT.
5. THE TOP OF THE JUNCTION BOX SHALL BE FLUSH WITH SURROUNDING GRADE OR CONCRETE FLATWORK EXCEPT AS DIRECTED WHEN AREA IS SUBJECT TO WHEEL LOAD. IF WHEEL IS ANTICIPATED, THE JUNCTION BOX SHALL THEN BE COVERED BY A 6 mm STEEL PLATE OVERLAPPING THE JCT. BOX BY A MINIMUM OF 40 mm ON ALL SIDES AND A MINIMUM OF 100 mm LAYER OF ASPHALT.

SPECIFICATIONS FOR TYPE I & II JUNC. BOX AND COVER

A. MADE FROM HIGH DENSITY POLYETHYLENE WITH ULTRA VIOLET INHIBITORS.

B. NON-SKID SURFACE

C. VANDAL RESISTANT RECESSED BOLTS.

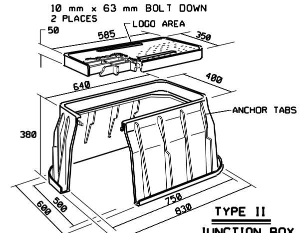
D. MINIMUM WALL THICKNESS 6 mm

E. SUPPORT WHEEL LOAD OF 3630 kg. AND A MINIMUM DEFLECTION OF 25 mm WITH A 2270 kg. LOAD USING A 160 mm DIA. LOAD

F. LOGO AREA
1. SIGNAL CONTRACTS USE LOGO 'SIGNAL'
2. LIGHTING CONTRACTS USE LOGO 'STREET LIGHTING'

G. SHALL COMPLY WITH THE FOLLOWING AVERAGE PHYSICAL AND CHEMICAL PROPERTIES.

PROPERTIES	ASTM	HDPE
TENSILE STRENGTH	D638	29 650 kPa
FLEXURAL MODULUS	D790	1310 M Pa
DEFLECTION TEMP. @ 455 kPa	D648	74° C
UNNOTCHED IMPACT	D256	0.107 Nm/mm
EFFECT OF ACIDS	D543	VERY RESISTANT
EFFECT OF ALKALIES	D543	VERY RESISTANT



TYPE II

JUNCTION BOX

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	BY	REVISIONS	APPR.
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.	

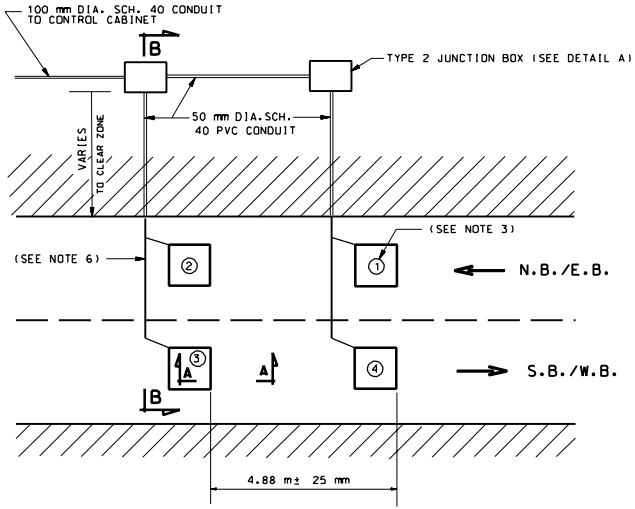
REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

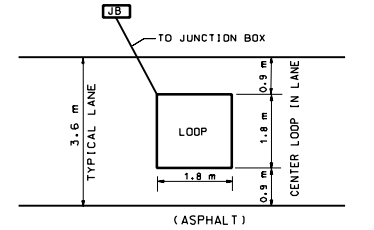
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — APR.22,1999 DATE
APPROVED
DEPUTY DIRECTOR — APR.22,1999 DATE

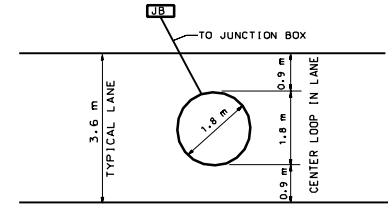
(METRIC)
JUNCTION BOX DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
745-55M



PLAN VIEW

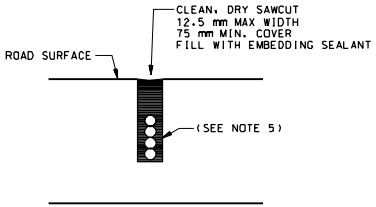




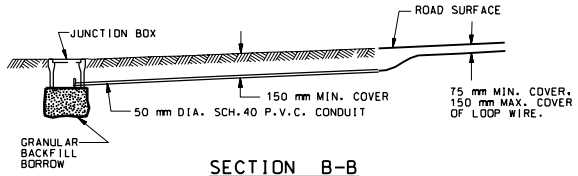
TYPICAL LOOP DETAIL

NOTES:

1. CONTACT UDOT TRAFFIC MONITORING SUPERVISOR. (801) 964-4532. PRIOR TO CONSTRUCTION.
2. SEE PLAN SHEETS FOR DETECTOR LOOP LOCATIONS. STATION AND OFFSET GIVEN FOR CENTER OF LOOP.
3. TAG EACH LOOP WIRE IN EACH JUNCTION BOX. NUMBER EACH LOOP CONSECUTIVELY. BEGIN WITH FIRST LOOP IN NORTH BOUND (EAST BOUND) LANE. CLOSEST TO SHOULDER - IN DIRECTION OF TRAFFIC. THEN SECOND LOOP IN SAME LANE. THEN ADJACENT LANE IF MORE THAN ONE. THEN OPPOSITE DIRECTION ADJACENT LANE. ENDING WITH SECOND LOOP IN OPPOSITE DIRECTION LANE CLOSEST TO SHOULDER.
4. USE SEPARATE WIRE FOR EACH LOOP. EACH LOOP WIRE TO BE CONTINUOUS. WITH NO SPLICES. EXCEPT WITH THE LEAD-IN WIRE AT THE JUNCTION BOX.
5. ALL LOOPS TO HAVE FOUR TURNS OF WIRE IN THE SAME DIRECTION. COUNTER CLOCKWISE. WITHOUT ANY TWIST.
6. TWIST WIRES BETWEEN LOOP AND JUNCTION BOX. THREE TWISTS PER METER IN SAW CUT. TEN TWISTS PER METER IN CONDUIT.



SECTION A-A



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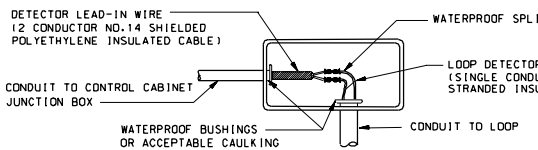


DETAIL "A"

REVISIONS			
NO.	DATE	APPR	REMARKS
1	09/07/00	REW	CHANGE TRENCH WIDTH IN SECTION A-A (CONDUIT)
2	06/15/01	CK	REMOVED SECTION A-A (CONDUIT) AND ADDED DETAIL "TYPICAL LOOP DETAIL-FOR P.C.C.P."

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — AUG.14.2001 — DATE
CHAIRMAN, STANDARDS COMMITTEE — DATE
APPROVED — AUG.14.2001 — DATE
DEPUTY DIRECTOR — DATE

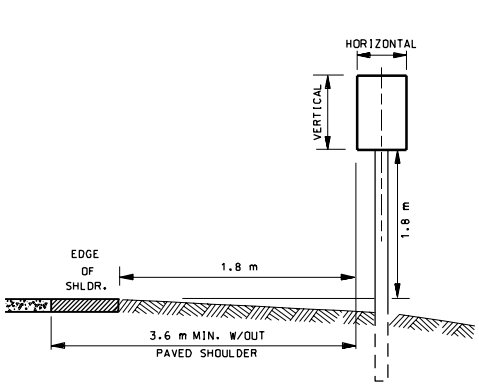
(METRIC)

STANDARD DRAWING TITLE

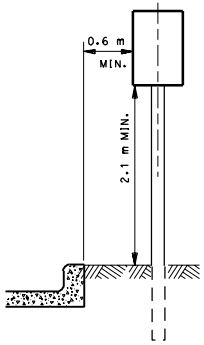
TRAFFIC COUNTING LOOP DETECTOR DETAIL

STD. DWG. NO.
745-55N

REGULATORY. WARNING. ROUTE MARKERS

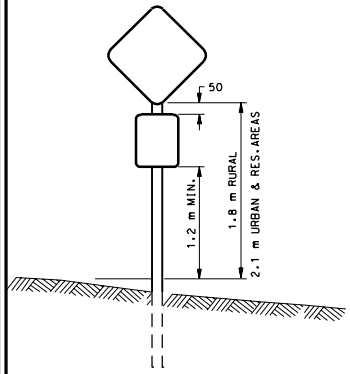


RURAL

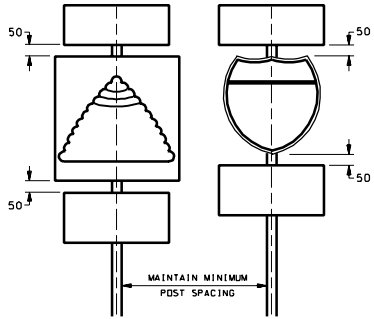


RESIDENTIAL – URBAN

SIGN INSTALLATION

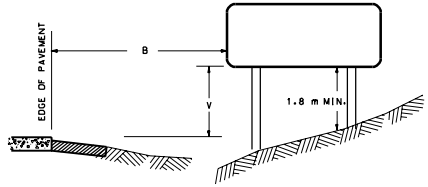


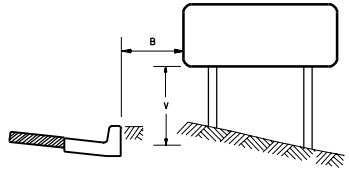
W/SUPPLEMENTAL SIGN

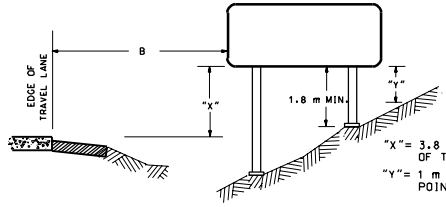


ROUTE MARKERS

GUIDE & DIRECTIONAL SIGNING







"X"= 3.8 m MAX. ABOVE EDGE OF TRAVEL LANE.

"Y"= 1 m MIN. GROUND TO ANY POINT OF SIGN PANEL.

GUIDE & DIRECTIONAL SIGN PLACEMENT

(B) LATERAL PLACEMENT			(V) VERTICAL PLACEMENT	
RURAL	URBAN	INTERSTATE	INTERSTATE	CONVENTIONAL RURAL & URBAN
1.8 m-3.6 m FROM EDGE OF PAVEMENT OR SHOULDER	0.6 m MIN. W/CURB.	DESIRABLE-9 m from TRAVEL LANE ACCEPTABLE-3.6 m MIN. FROM EDGE OF SHOULDER	DESIRABLE-2.1 m ACCEPTABLE-1.5 m	2.1 m
	0.6 m MIN.+ SHOULDER		2.1 m	2.1 m
	W/O CURB	0.6 m MIN. WHEN BEHIND BARRIER	2.1 m	2.1 m

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

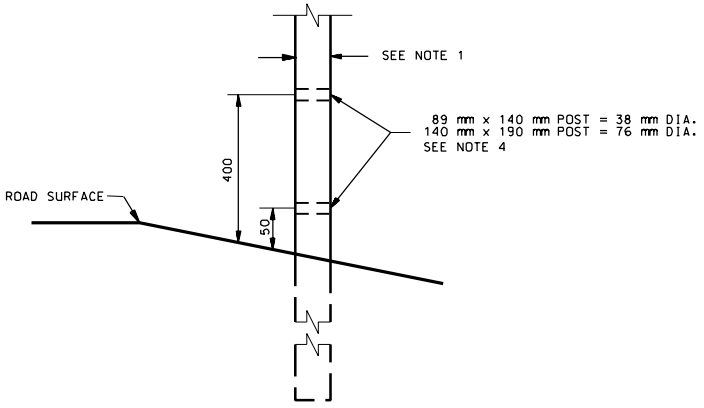
NO.	DATE	APPR.	REMARKS
1	12/17/97		CORRECT DIMENSION IN WEAKENED POST DETAIL
2	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT
3	07/19/01	F.L.	REMOVED TIMBER SIGN POST TABLE, ADDED GUIDE AND DIRECTIONAL SIGNS, CHANGED DRAWING TITLE.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — SEP.11.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — SEP.11.2001 DATE
DEPUTY DIRECTOR

(METRIC)
STANDARD DRAWING TITLE
PLACEMENT OF GROUND MOUNT SIGNS

STD. DWG. NO.
745-60



WEAKENED POST

DETAIL

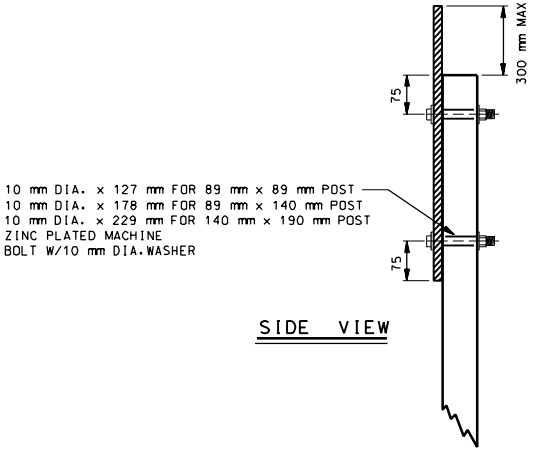
SEE NOTE 3

TIMBER SIGN POSTS (Nominal)

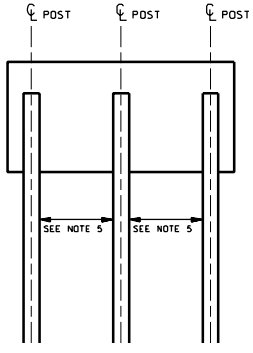
HORIZONTAL SIGN DIMENSION (mm)

VERTICAL SIGN DIMENSION (mm)	305	610	914	1219	1524	1829	2134	2438	2743	3048	3353	3658
305	1- 89x89 1.2	1- 89x89 1.2	1- 89x89 1.2	1- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2
457	1- 89x89 1.2	1- 89x89 1.2	1- 89x89 1.2	1-89x140 1.2	2- 89x89 1.2	2- 89x89 1.2	2- 89x89 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2
610	1- 89x89 1.2	1- 89x89 1.2	1-89x140 1.2	1-89x140 1.2	2- 89x89 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2
762	1- 89x89 1.2	1- 89x89 1.2	1-89x140 1.2	1-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	3-89x140 1.2	3-89x140 1.2
914	1- 89x89 1.2	1-89x140 1.2	1-89x140 1.2	1-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	3-89x140 1.2	3-89x140 1.2	3-89x140 1.2	3-89x140 1.2
1067	1- 89x89 1.2	1-89x140 1.2	1-89x140 1.2	1-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2	3-89x140 1.2	3-89x140 1.2	3-89x140 1.2	2-140x190 1.5	2-140x190 1.5
1219	1- 89x89 1.2	1-89x140 1.2	1-89x140 1.2	2-89x140 1.2	2-89x140 1.2	2-89x140 1.2		3-89x140 1.2	3-89x140 1.2	2-140x190 1.2	2-140x190 1.5	2-140x190 1.5
1372	1- 89x89 1.2	1-89x140 1.2	1-140x190 1.5	2-89x140 1.2	2-89x140 1.2	1-140x190 1.5		2-140x190 1.5	2-140x190 1.5	2-140x190 1.5	2-140x190 1.5	2-140x190 1.5
1524	1-89x140 1.2	1-89x140 1.2	1-140x190 1.5	2-89x140 1.2	1-140x190 1.5	1-140x190 1.5		2-140x190 1.5	2-140x190 1.5	2-140x190 1.5	2-140x190 1.5	2-140x190 1.5
1676	1-89x140 1.2	1-89x140 1.2	1-140x190 1.5	2-89x140 1.2	1-140x190 1.5			2-140x190 1.5	2-140x190 1.5	2-140x190 1.5	2-140x190 1.5	
1829	1-89x140 1.2	1-140x190 1.5	1-140x190 1.5	1-140x190 1.5	1-140x190 1.5			2-140x190 1.5	2-140x190 1.5	2-140x190 1.5		

LEGEND 2-89x140 / 1.5 — NUMBER & SIZE (mm x mm) OF POSTS; EMBEDMENT DEPTH IN METERS



SIDE VIEW



MULTIPLE POST SIGN

NOTES:

1. NARROW POST DIMENSION TO FACE TRAFFIC.
2. MULTIPLE SIGN INSTALLATION ON SINGLE POST, EXCLUDING ROUTE MARKERS, SHALL USE ONE 89 mm x 140 mm POST.
3. MIN. DEPTH OF EMBEDMENT SHALL BE 1.2 m UNLESS 1.5 m IS SHOWN.
4. FIELD DRILL TWO HOLES IN THE CENTER OF THE POST. DRILL PERPENDICULAR TO THE CENTER LINE OF THE ROAD.
5. MINIMUM SPACING BETWEEN POSTS:

	POST SIZE		SPACING
* FOR 3 OR MORE POSTS	89 x 89	= =	1.1 m
* FOR 3 OR MORE POSTS	89 x 140	= =	1.1 m
FOR 2 OR MORE POSTS	140 x 190	= =	2.2 m

* FOR 2 POSTS OF THIS SIZE THERE IS NO MINIMUM SPACING SPECIFIED (0 - 1.2 m)

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC.11.2001 DATE

CHAIRMAN STANDARDS COMMITTEE
APPROVED

DEPUTY DIRECTOR — DEC.11.2001 DATE

(METRIC)

STANDARD DRAWING TITLE

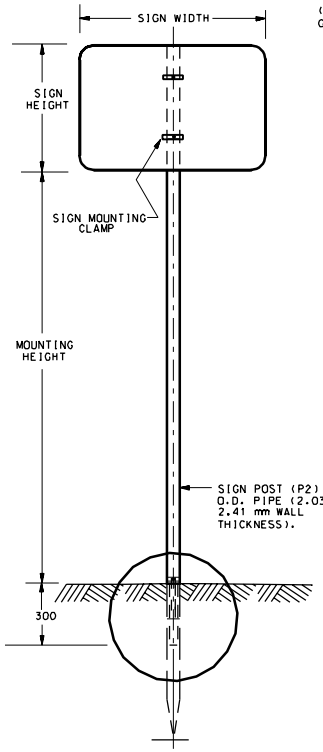
GROUND MOUNT
TIMBER SIGN POST (P1)

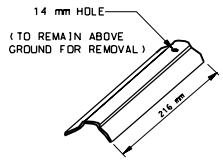
STD. DWG. NO.

745-60A

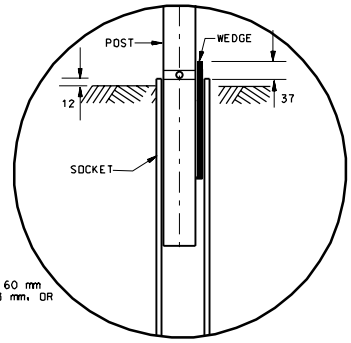
TUBULAR STEEL POST (P2)

(SOCKET SYSTEM)
(SINGLE OR DOUBLE POST)





WEDGE



TUBULAR STEEL SIGN POSTS

VERTICAL SIGN DIMENSION (mm) \ HORIZONTAL SIGN DIMENSION (mm)	300	600	900	1200	1500	1800	2125	2425	2740	3040	3350	3650
300	1 P2	1 P2	1 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2
450	1 P2	1 P2	1 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2
600	1 P2	1 P2	1 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	2 P2	1 P4	1 P4
760	1 P2	1 P2	1 P2	2 P2	2 P2	2 P2	2 P2	2 P2	1 P4	1 P4	1 P4	1 P4
900	1 P2	1 P2	1 P2	2 P2	2 P2	2 P2	1 P4	1 P4	1 P4	1 P4	1 P4	1 P4
1060	1 P2	1 P2	1 P2	2 P2	2 P2	1 P4	1 P4	1 P4	2 P4	2 P4	2 P4	2 P4
1200	1 P2	1 P2	2 P2	2 P2	2 P2	1 P4	1 P4	2 P4	2 P4	2 P4	2 P4	2 P4
1350	1 P2	1 P2	2 P2	2 P2	1 P4	1 P4	2 P4	2 P4	2 P4	2 P4	2 P4	2 P4
1500	1 P2	1 P2	2 P2	2 P2	1 P4	1 P4	2 P4	2 P4	2 P4	2 P4	2 P4	2 P4
1650	1 P4	1 P4	1 P4	1 P4	1 P4	2 P4	2 P4	2 P4	2 P4	2 P4		
1800	1 P4	1 P4	1 P4	1 P4	1 P4	2 P4	2 P4	2 P4	2 P4	2 P4		

LEGEND: 1 / P4 — NUMBER OF POSTS / TYPE OF POST
P2 = 60 mm x 0.80 (SOCKET SYM.)
P4 = 63 mm x SCH. 80 (SLIPBASE)

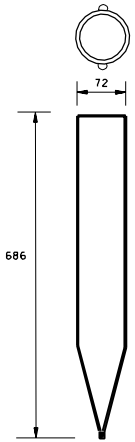
NOTES:

1. FOR SOFT SOIL CONDITIONS USE TRIANGULAR STEEL SIGN POST ANCHOR OR PLACE TUBULAR SOCKET IN A 150 mm DIAMETER BY 380 mm DEEP CONCRETE FOUNDATION.
2. YELLOW POSTS MAYBE USED FOR LEFT SIDE (MEDIAN) SIGN INSTALLATIONS AND FOR SIGN LOCATIONS HAVING A HIGH PROBABLY OF IMPACTS AS DETERMINED BY THE REGION TRAFFIC ENGINEER.

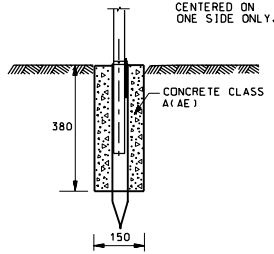
POST NOTES:

POSTS PRE-PUNCHED WITH 10 mm HOLES.
MOUNT SIGN DIRECTLY TO POST OR USE AN APPROVED MOUNTING CLAMP. SPACING OF HOLES. FROM TOP IN MILLIMETERS ARE AS FOLLOWS :

25. 76. 250. 400. 530. 580. 600. 680. 830. 940. 990 AND 1140

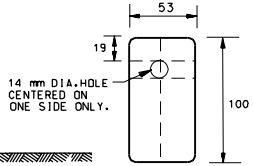


TUBULAR SOCKET

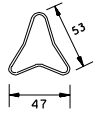


CONCRETE FOUNDATION
SEE NOTE 1

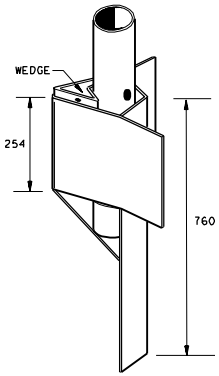
WEDGE



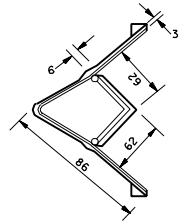
SIDE VIEW



TOP VIEW



TRIANGULAR STEEL SIGN POST ANCHOR
SEE NOTE 1



TOP VIEW

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

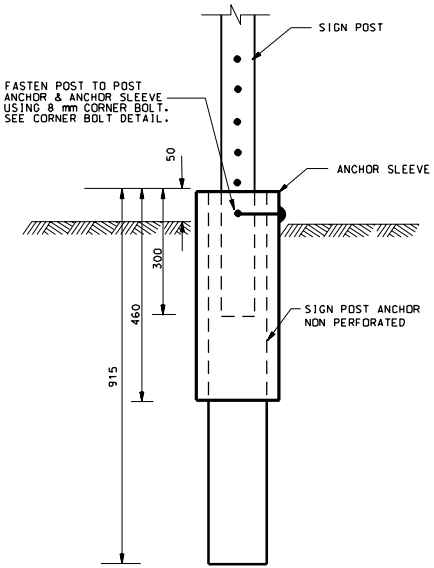
RECOMMENDED FOR APPROVAL — DEC.11.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — DEC.11.2001 DATE
DEPUTY DIRECTOR

(METRIC)

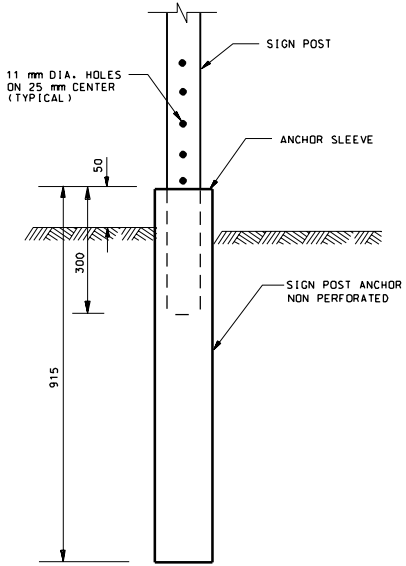
STANDARD DRAWING TITLE
GROUND MOUNT TUBULAR STEEL SIGN POST (P2)

STD. DWG. NO.
745-60B

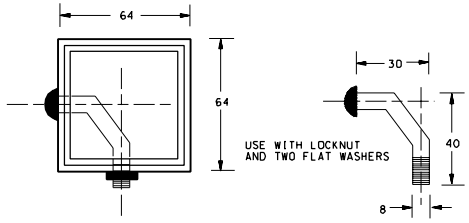
SIGN INSTALLATION



TYPICAL INSTALLATION .
HIGH IMPACT AREAS
(TWO PIECE BREAKAWAY ANCHOR)



TYPICAL INSTALLATION
(W/ONE PIECE BREAKAWAY ANCHOR)



CORNER BOLT DETAIL

SQUARE STEEL SIGN POSTS

VERTICAL SIGN DIMENSION (mm) \ HORIZONTAL SIGN DIMENSION (mm)	300	600	900	1200	1500	1800	2100	2400	2750	3050	3350	3650
300	1 T1	1 T1	1 T1	1 T1	2 T1	2 T1	2 T1	2 T1	2 T1	2 T1	2 T1	2 T1
450	1 T1	1 T1	1 T1	1 T1	2 T1	2 T1	2 T1	2 T1	2 T1	2 T1	2 T1	2 T2
600	1 T1	1 T1	1 T1	1 T1	2 T1	2 T1	2 T1	2 T1	2 T2	2 T2	2 T2	2 T2
760	1 T1	1 T1	1 T2	2 T1	2 T1	2 T1	2 T2	2 T2	2 T2	2 T2	2 T2	
900	1 T1	1 T1	1 T2	2 T1	2 T1	2 T2	2 T2	2 T2	2 T2			
1060	1 T1	1 T2	1 T2	2 T1	2 T2	2 T2	2 T2					
1200	1 T1	1 T2	2 T1	2 T2	2 T2	2 T2						
1350	1 T1	1 T2	2 T2	2 T2	2 T2							
1500	1 T1	1 T2	2 T2	2 T2								
1650	1 T1	1 T2	2 T2									
1800	1 T1	1 T2	2 T2									

T1 = 50 mm 12 GAUGE W/56 mm ANCHOR. 63mm SLEEVE
T2 = 63 mm 12 GAUGE W/70 mm ANCHOR. 76 mm SLEEVE

1. FOR SOFT SOIL USE TRIANGULAR STEEL SIGN POST ANCHOR: REFER TO STD.DWG. 745-60B

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC.11.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — DEC.11.2001 DATE
DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE
GROUND MOUNT SQUARE STEEL SIGN POST (P3)

STD. DWG. NO.
745-60C

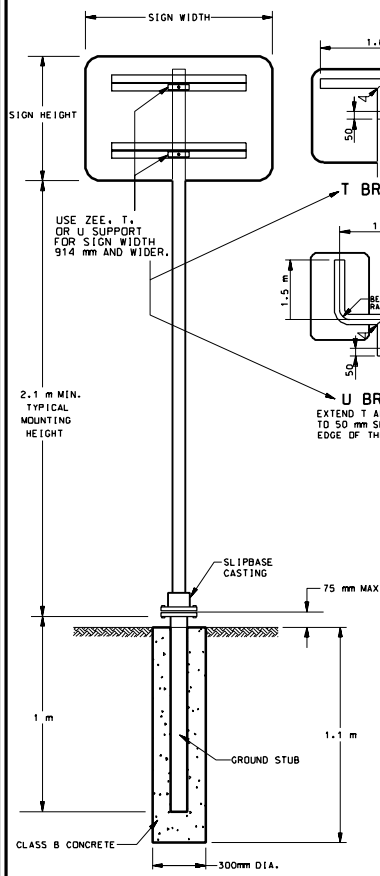
TUBULAR STEEL POSTS (P1)

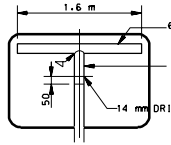
(WITH SLIPBASE)

(SINGLE OR DOUBLE POST)

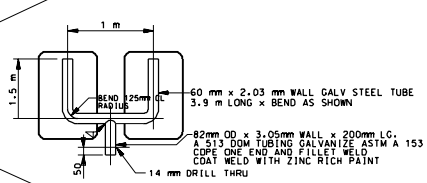
STANDARD PIPE SIZE	A	B	C	D	E	F	G	K	L	R_1	R_2
50	95	70	37	28	12	5	25	68	31	31	30
62	108	82	50	31	12	6	25	80	37	37	36

DIMENSIONS FOR MOUNTING CLAMP



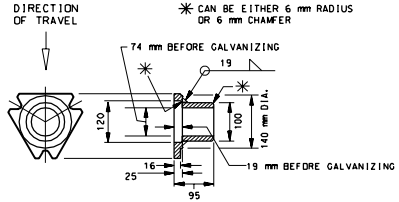


T BRACKET

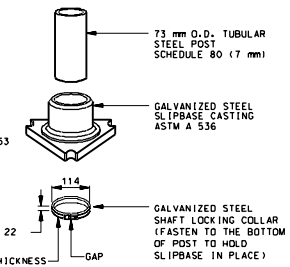


U BRACKET

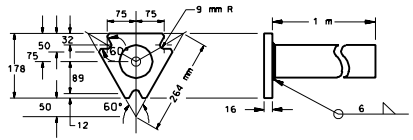
EXTEND T AND U BRACKETS TO 50 mm SHORT OF THE EDGE OF THE PANEL.



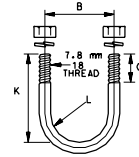
SLIPBASE CASTING



TYPICAL ASSEMBLY



SLIPBASE STUB POST

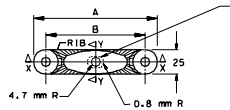


U-BOLT TO BE MADE IN ACCORDANCE WITH STANDARD MANUFACTURING PROCEDURE.
7.1 mm OR 7.8 mm DIAMETER STOCK IS PERMISSIBLE.
AMERICAN STANDARD REGULAR SEMI-FINISHED HEX NUTS AND SPRING LOCKWASHERS.

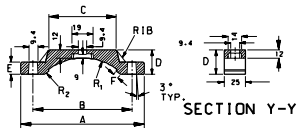
PIPE CLAMP CASTING

PIPE CLAMP CASTING: ASTM B26 OR B108
ALUMINUM ALLOY A444.0-T4 OR 356.0-F.
ALL SIGN MOUNTING CLAMP PARTS NOT MADE FROM ALUMINUM: GALVANIZED IN CONFORMANCE WITH ASTM A 153 OR STAINLESS STEEL.

U-BOLT



SLOT TO HOLD HEAD OF 9 mm HEX HEAD BOLT. BOLT: 32 mm LONG. WITH FULL THREADS. A MEDIUM WASHER, AND GALVANIZED STEEL OR ALUMINUM SELF-LOCKING HEX HEAD NUT. THE BOLT HEAD MUST NOT TURN IN THE SLOT.



MOUNTING CLAMP FOR SOCKET OR SLIPBASE

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC.11.2001 DATE

CHAIRMAN STANDARDS COMMITTEE

APPROVED — DEC.11.2001 DATE

DEPUTY DIRECTOR

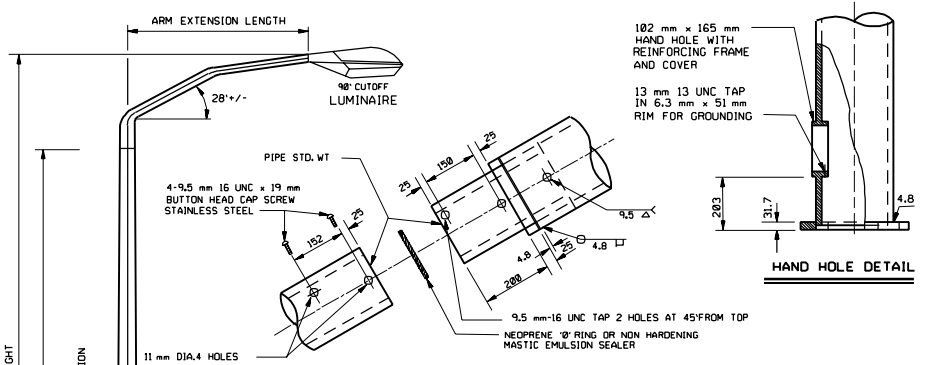
(METRIC)

STANDARD DRAWING TITLE

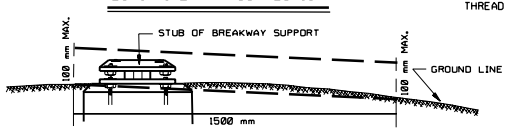
SLIPBASE GROUND MOUNT TUBULAR STEEL SIGN POST (P4)

STD. DWG. NO.

745-60D

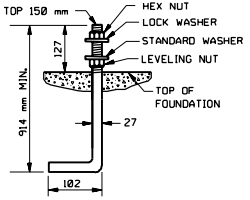


LUMINAIRE ARM CONNECTION

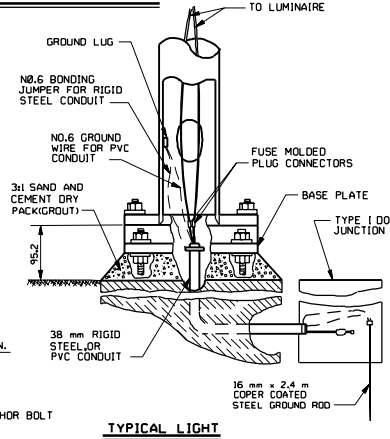


PLACE LIGHT POLE FOUNDATION SO IMPACTING VEHICLES DO NOT SNAG ON EITHER FOUNDATION OR ANY SUBSTANTIAL REMAINS OF LIGHT POLE. GRADE SURROUNDING TERRAIN TO PERMIT IMPACTING VEHICLES TO PASS OVER FOUNDATION AND PORTIONS OF LIGHT POLE SUPPORT WHICH REMAIN IN THE GROUND OR ARE RIGIDLY ATTACHED TO THE FOUNDATION.

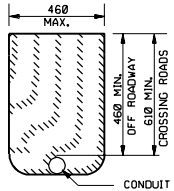
ANCHOR BOLT



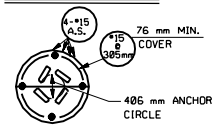
BREAKAWAY SUPPORT STUB HEIGHT MEASUREMENT



TRENCHING DETAIL



EPOXY COATED REINFORCING STEEL



SECTION A-A

TYPICAL LIGHT POLE CONNECTIONS

SHAFT HEIGHT	POLE HEIGHT	ARM EXTENSION DIMENTIONS		MIN. SHAFT BOTTOM O.D. (mm)	MIN. SHAFT TOP O.D. (mm)	MIN. WALL THICKNESS (mm)	MAX. SHAFT TOP DEFLECTION (mm)
		LENGHT	END DIA. (mm)				
8.5 m	9.4 m	1.8 m	60.3	200	101.6	3.04	114.3
	9.7 m	3.0 m	60.3	200	101.6	3.04	114.3
11.6 m	12.5 m	1.8 m	60.3	238.1	101.6	3.04	152.4
	12.8 m	3.0 m	60.3	238.1	101.6	3.04	152.4

NOTES:

1 - LIGHT POLE ASSEMBLY

A-THE ASSEMBLY SHALL CONSIST OF POLE, ARM, BASE, INTERNAL CONDUCTORS, IDENTIFICATION, SPLICES, MOLDED CONNECTORS, FUSES, ANCHOR BOLTS, HARDWARE AND BREAK-AWAY BASE OR ANCHOR BASE.

2 - POLE

A-THE LIGHT POLE DESIGN UTILITES TAPERED STEEL POLES AND SHALL MEET ASTM A 570 GRADE 33 GALVANIZED IN ACCORDANCE WITH ASTM A 123. OTHER LIGHT POLE MATERIALS MAY BE ACCEPTABLE SUBJECT TO THE APPROVAL OF DESIGN AND DRAWINGS PRIOR TO THE OPENING OF BIDS BY THE DEPUTY DIRECTOR. SHOP DRAWINGS REQUIRED.

B-POLE AND ARM DESIGN SHALL BE THE SAME THROUGHOUT THE PROJECT AND SHALL MEET THE REQUIREMENTS OF AASHTO SPECIFICATIONS FOR STRUCTURAL SUPPORT FOR HIGHWAY SIGNS, LUMINARES AND TRAFFIC SIGNALS, 1994 EDITION,
FOR AN 130 km/h WIND WITH 170 km/h GUSTS.
ALLOWABLE STRESSES: ASTM A 570 GRADE 33-F_b=150.17 MPa
F_v=75.88 MPa

(INCREASE 40% FOR GROUP II AND III LOADING)

C-ARM EXTENSION CONNECTIONS, COMPONENTS AND DETAILS SHALL BE COMPATIBLE WITH THE TYPE OF POLE UTILIZED.

D-LIGHT POLE BASE PLATE SHALL BE FURNISHED TO MATCH EXISTING BOLT CIRCLE WHEN POLE IS LOCATED ON STRUCTURE.

E-LIGHT POLE DESIGN SHALL BE FOR A LUMINARE WEIGHT OF 35 kg AND A PROJECTED AREA OF 0.3 m^2

F-ALL ARM EXTENSIONS SHALL BE ORIENTED AT RIGHT ANGLES TO THE SURVEY LINE OF ROADWAY.

G-OFFSET IS DEFINED AS THE DISTANCE FROM THE EDGE OF TRAVELED WAY TO THE SHAFT CENTER OF THE LIGHT POLE.

H-CENTER SHAFT TOP OVER CENTER OF FUNDATION AFTER ARM EXTENSION, LUMINARE AND ALL ELECTRICAL ACCESSORIES ARE IN PLACE.

J-MAXIMUM ALLOWABLE DEFLECTION AT SHAFT TOP IS BASED ON 445 N HORIZONTAL LOAD APPLIED AT 150 mm BELOW TOP DEFLECTION CRITERIA SHALL BE MET REGARDLESS OF LIGHT POLE MATERIAL USED.

K-LOCATE LIGHT POLE BEHIND SIGNS WHEN THERE IS CONFLICT.

3 - FOUNDATION

A-ALL FOUNDATIONS SHALL BE CAST-IN-PLACE IN AUGERED HOLES WITH CLASS A(AE) CONCRETE

4 - BREAKAWAY BASE

A-BREAKAWAY BASE SHALL BE UTILIZED ON ALL LIGHT POLES EXCEPT THOSE LOCATED ON STRUCTURES OR SPECIFIED ON PLANS.

B-SEE STANDARD DWG. 745-55D FOR BREAKAWAY BASE DETAILS.

5 - ANCHOR BOLTS

A-ASTM A 307, ANCHOR BOLTS SHALL BE HOOKED 27 mm x 914 mm x 101.6 mm WITH HEAVY HEXAGON NUTS. ALL NUTS, WASHERS AND TOP 254 mm OF THE ANCHOR BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A 123. ANCHOR BOLT THREADS SHALL BE OPEN AND DEFECT FREE. NUTS SHALL BE FREE RUNNING BY HAND FOR TOTAL THREAD LENGTH.

B-ANCHOR BOLTS SHALL BE PLACED BY TEMPLATE AND SHALL NOT BE WELDED TO REINFORCING STEEL.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1.	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED, NO CHANGE IN CONCEPT.
2.	06/25/01	D.F.S.	REVISED BREAKAWAY SUPPORT DETAIL.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JULY 10,2001 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED

DEPUTY DIRECTOR — JULY 10,2001 DATE

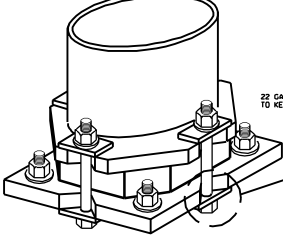
(METRIC)

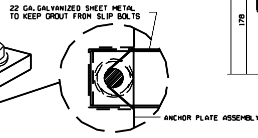
LIGHT POLE BREAKAWAY BASE

STANDARD DRAWING TITLE

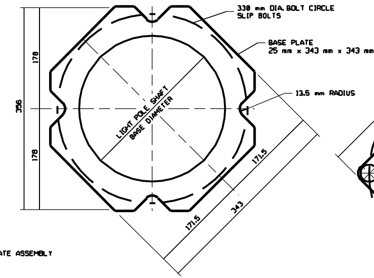
STD. DWG. NO.

755-1

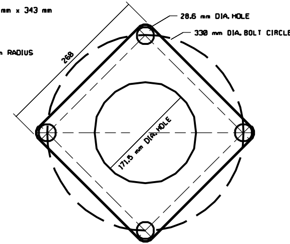




DETAIL

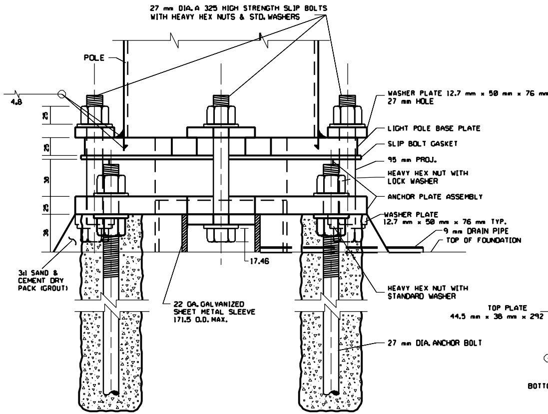


LIGHT POLE BASE PLATE

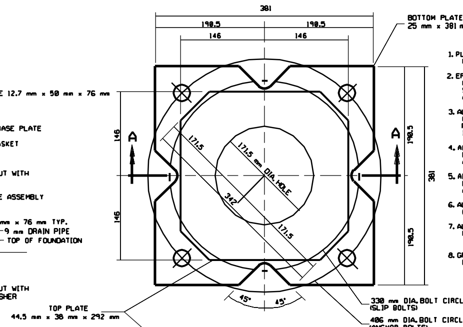


SLIP BOLT RETAINER GASKET

(28 GAUGE STAINLESS STEEL)



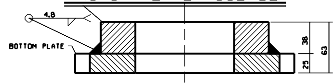
LIGHT POLE BASE



ANCHOR PLATE ASSEMBLY

NOTES:

1. PLACE ANCHOR PLATE ASSEMBLY ON LEVELING NUTS ON ANCHOR BOLTS AND SECURE IN PLACE.
2. ERECT LIGHT POLE AND SECURE WITH M 27 DIA. HIGH STRENGTH BOLTS. BOLTS SHALL BE INSTALLED IN THE SLOTS SO THE BOLT SHANKS ARE IN CONTACT WITH THE PLATES.
3. ALL STRUCTURAL STEEL FOR PLATES SHALL CONFORM TO ASTM A36, EXCEPT THE ANCHOR PLATE ASSEMBLY WHICH MAY BE FURNISHED CAST IN COMPLIANCE WITH ASTM A 27, GRADE 70-40.
4. ALL STEEL PLATE ASSEMBLIES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.
5. ALL SLIP BOLTS, NUTS AND WASHERS SHALL BE ELECTRO PLATED ZINC IN ACCORDANCE WITH ASTM A 165 TYPE NS.
6. ALL CONTACT AREAS OF PLATES SHALL BE FREE OF GALVANIZING BEADS OR RUNS.
7. ALL SLIP BOLTS SHALL BE TORQUED TO 109 N•m RELEASED AND RETORQUED TO 95 N•m
8. GROUTING SHALL BE DONE AFTER LIGHT POLE HAS BEEN LOCATED IN FINAL POSITION.



SECTION A - A

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE		REMARKS
1	04/22/99	B.A.	DRAWINGS ELECTRONICALLY ENHANCED. NO CHANGE IN CONCEPT.

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: CHAIRMAN STANDARDS COMMITTEE — APR. 22, 1999 DATE

APPROVED: DEPUTY DIRECTOR — APR. 22, 1999 DATE

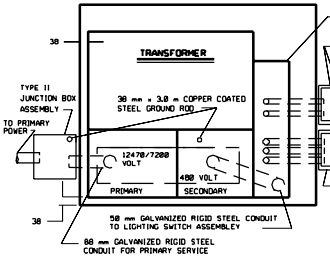
(METRIC)

LUMINAIRE BREAKAWAY BASE DETAIL

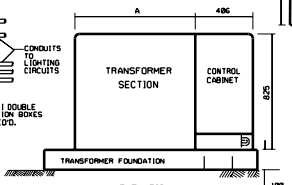
STANDARD DRAWING TITLE

STD. DWG. NO.

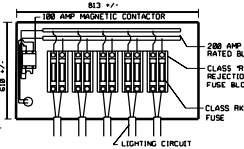
755-2



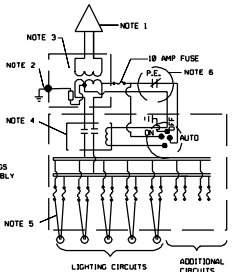
DIMENSION "A"		
25 TO 50 KVA	75 KVA	100 KVA
837	1025	1016



ELEVATION



LIGHTING SWITCH ASSEMBLY



SCHEMATIC CONNECTION DIAGRAM

NOTES:

1- POWER COMPANY SERVICE POINT, SINGLE PHASE VOLTAGE WITH DISCONNECTING PROVISIONS; POWER COMPANY TO RUN UNDER GROUND CABLE CONNECTION IN CONTRACTOR FURNISHED TRENCH TO TRANSFORMER HIGH VOLTAGE TERMINALS. CONTRACTOR SHALL:

(A) CONTACT SERVING POWER COMPANY TO VERIFY PRIMARY VOLTAGE AND TYPE OF CONNECTION.

(B) NOTIFY SERVING POWER COMPANY A MINIMUM OF 24 HOURS IN ADVANCE OF DESIRED POWER SOURCE CONNECTION.

2- GROUND TRANSFORMER FRAME.

3- FOUNDATION MOUNTED TRANSFORMER WITH DEAD FRONT DESIGN.

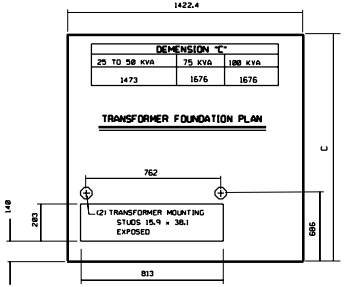
4- LIGHTING SWITCH ASSEMBLY WITH LOAD FUSE BLOCKS, FUSES, AND CONDUITS FOR LIGHTING CIRCUITS AS PER PLANS.

5- INDIVIDUAL LIGHTING CIRCUITS TO TYPE I DOUBLE JUNCTION BOXES.

6- PHOTO ELECTRIC CONTROL AND MOUNTING RECEPTACLE MAY BE STRAP MOUNTED AT TOP OF NEAREST LIGHT POLE (INCLUDE CONTROL CIRCUITS IN LIGHTING CIRCUIT CONDUIT), OR MOUNTED 3 m HIGH ON 50 mm DIA. GALVANIZED RIGID STEEL PIPE LOCATED NEXT TO TRANSFORMER.

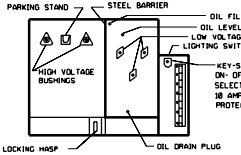
7- POWER POLE MOUNTED LIGHTNING ARRESTERS REQUIRED.

8- TRANSFORMER PAD LOCATION SHALL BE WELL DRAINED. EXACT LOCATION OF PAD AND JUNCTION BOXES SHALL BE DETERMINED BY PROJECT ENGINEER.

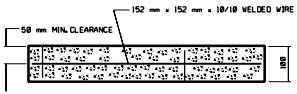


DEMENSION "C"		
25 TO 50 KVA	75 KVA	100 KVA
1473	1676	1676

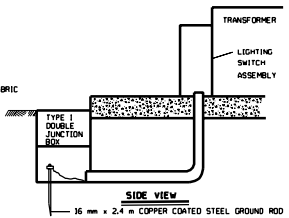
TRANSFORMER FOUNDATION PLAN



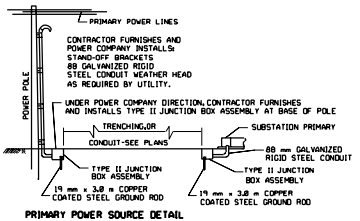
FRONT VIEW, DOOR OPEN



REINFORCED CONCRETE



SIDE VIEW



PRIMARY POWER SOURCE DETAIL

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS				
NO.	DATE	BY	DRAWING ELECTRONICALLY ENHANCED NO CHANGE IN CONCEPT	REMARKS
1	8/22/99	BA		

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR-22-1999 DATE

APPROVED STANDARDS COMMITTEE — APR-22-1999 DATE

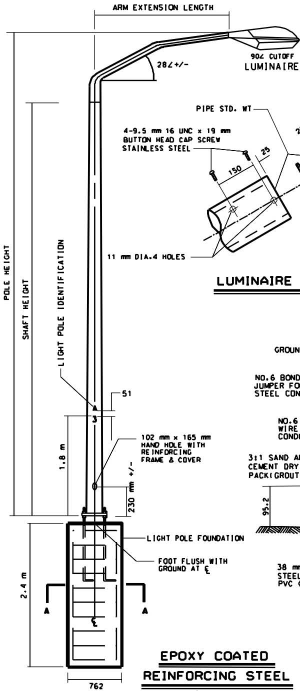
DEPUTY DIRECTOR

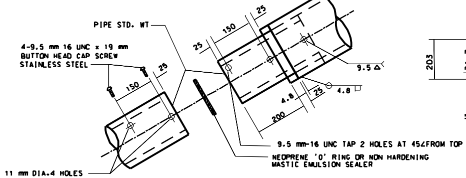
(METRIC)

STANDARD DRAWING TITLE

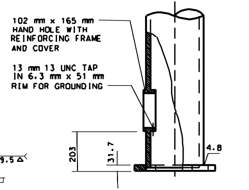
SINGLE TRANSFORMER SUBSTATION DETAILS

STD. DWG. NO.
755-3



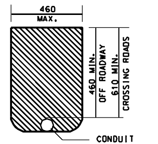


LUMINAIRE ARM CONNECTION

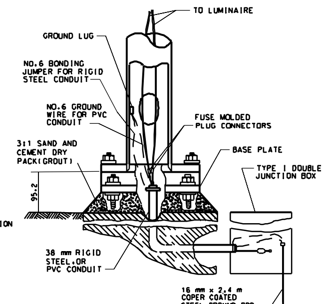


HAND HOLE DETAIL

SHAFT HEIGHT	POLE HEIGHT	ARM EXTENSION DIMENTIONS		MIN. SHAFT BOTTOM O.D. (mm)	MIN. SHAFT TOP O.D. (mm)	MIN. WALL THICKNESS (mm)	MAX. SHAFT TOP DEFLECTION (mm)
		LENGHT	END DIA. (mm)				
8.5 m	9.4 m	1.8 m	60.3	200	101.6	3.04	114.3
	9.7 m	3.0 m	60.3	200	101.6	3.04	114.3
11.6 m	12.5 m	1.8 m	60.3	238.1	101.6	3.04	152.4
	12.8 m	3.0 m	60.3	238.1	101.6	3.04	152.4



TRENCHING DETAIL



TYPICAL LIGHT POLE CONNECTIONS

NOTES:

1 - LIGHT POLE ASSEMBLY

A-THE ASSEMBLY SHALL CONSIST OF POLE, ARM, BASE, INTERNAL CONDUCTORS, IDENTIFICATION, SPLICES, MOLDED CONNECTORS, FUSES, ANCHOR BOLTS, HARDWARE AND BREAK-AWAY BASE OR ANCHOR BASE.

2 - POLE

A-THE LIGHT POLE DESIGN UTILITES TAPERED STEEL POLES AND SHALL MEET ASTM A 570 GRADE 33 GALVANIZED IN ACCORDANCE WITH ASTM A 123. OTHER LIGHT POLE MATERIALS MAY BE ACCEPTABLE SUBJECT TO THE APPROVAL OF DESIGN AND DRAWINGS PRIOR TO THE OPENING OF BIDS BY THE DEPUTY DIRECTOR. SHOP DRAWINGS REQUIRED.

B-POLE AND ARM DESIGN SHALL BE THE SAME THROUGHOUT THE PROJECT AND SHALL MEET THE REQUIREMENTS OF AASHTO SPECIFICATIONS FOR STRUCTURAL SUPPORT FOR HIGHWAY SIGNS, LUMINARES AND TRAFFIC SIGNALS, 1994 EDITION.
FOR AN 130 km/h WIND WITH 170 km/h GUSTS.
ALLOWABLE STRESSES: ASTM A 570 GRADE 33-Fb=150.17 MPa
Fv=75.08 MPa
(INCREASE 40% FOR GROUP II AND III LOADING)

C-ARM EXTENSION CONNECTIONS, COMPONENTS AND DETAILS SHALL BE COMPATIBLE WITH THE TYPE OF POLE UTILIZED.

D-LIGHT POLE BASE PLATE SHALL BE FURNISHED TO MATCH EXISTING BOLT CIRCLE WHEN POLE IS LOCATED ON STRUCTURE.

E-LIGHT POLE DESIGN SHALL BE FOR A LUMINARE WEIGHT OF 35 kg AND A PROJECTED AREA OF 0.3 m^2

F-ALL ARM EXTENSIONS SHALL BE ORIENTED AT RIGHT ANGLES TO THE SURVEY LINE OF ROADWAY.

G-OFFSET IS DEFINED AS THE DISTANCE FROM THE EDGE OF TRAVELED WAY TO THE SHAFT CENTER OF THE LIGHT POLE.

H-CENTER SHAFT TOP OVER CENTER OF FUNDATION AFTER ARM EXTENSION, LUMINARE AND ALL ELECTRICAL ACCESSORIES ARE IN PLACE.

J-MAXIMUM ALLOWABLE DEFLECTION AT SHAFT TOP IS BASED ON 445 N HORIZONTAL LOAD APPLIED AT 150 mm BELOW TOP DEFLECTION CRITERIA SHALL BE MET REGARDLESS OF LIGHT POLE MATERIAL USED.

K-LOCATE LIGHT POLE BEHIND SIGNS WHEN THERE IS CONFLICT.

3 - FOUNDATION

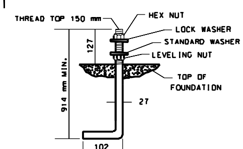
A-ALL FOUNDATIONS SHALL BE CAST-IN-PLACE IN AUGERED HOLES WITH CLASS A(AE) CONCRETE

4 - ANCHOR BOLTS

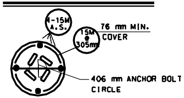
A-ASTM A 307, ANCHOR BOLTS SHALL BE HOOKED 27 mm x 914 mm x 101.6 mm WITH HEAWY HEXAGON NUTS, ALL NUTS, WASHERS AND TOP 254 mm OF THE ANCHOR BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A-123. ANCHOR BOLT THREADS SHALL BE OPEN AND DEFECT FREE. NUTS SHALL BE FREE RUNNING BY HAND FOR TOTAL THREAD LENGTH.

B-ANCHOR BOLTS SHALL BE PLACED BY TEMPLATE AND SHALL NOT BE WELDED TO REINFORCING STEEL.

ANCHOR BOLT



EPOXY COATED REINFORCING STEEL



SECTION A-A

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	03/08/00		CORRECT ROUNDING ERROR IN ARM CONNECTION DETAIL.

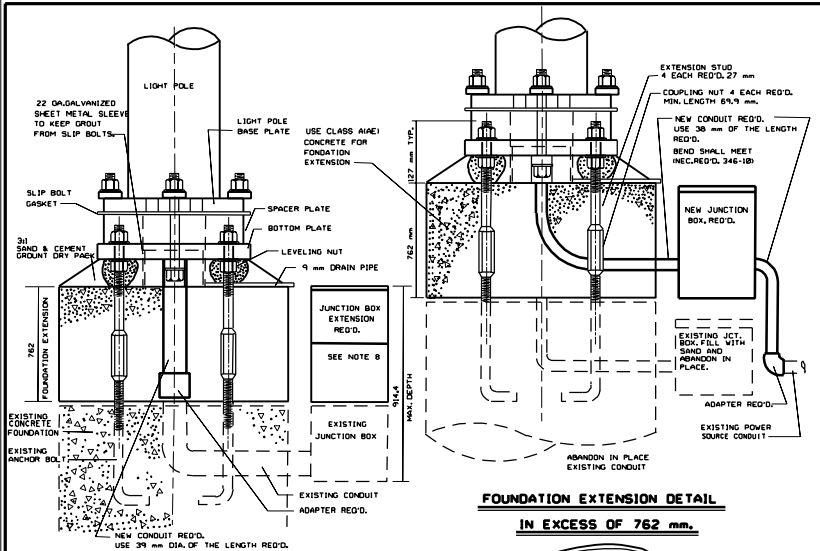
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL APR.27,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED APR.27,1999
DEPUTY DIRECTOR

(METRIC)
LIGHT POLE
ANCHOR BASE

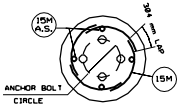
STANDARD DRAWING TITLE

STD. DWG. NO.
755-6



FOUNDATION EXTENSION DETAIL

REINFORCING STEEL SHALL COMPLY WITH ASTM DESIGNATION A 615 GRADE 60



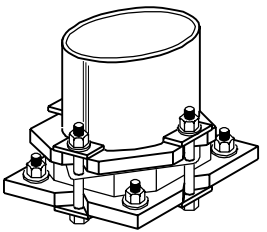
TIE REINFORCING HOOP TIE TO ANCHOR BOLT EXTENSION

SPACING GUIDE FOR REINFORCING STEEL HOOPTIE

RISE IN FOUNDATION EXTENSION	NO. OF RINGS
152 mm TO 304 mm	2
304 mm TO 762 mm	3
762 mm TO 1078 mm	4
1078 mm +	304.8 mm SPACING

TOP RING 76.2 mm CONCRETE COVER

FOUNDATION EXTENSION DETAIL IN EXCESS OF 762 mm.



BREAKAWAY BASE REASSEMBLY DETAIL

NOTES:

1. USE COUPLING NUTS AND EXTENSION STUDS ON EXISTING LIGHT POLE FOUNDATION FOR ANY EXTENSION HEIGHT REQUIRED.
2. COUPLING NUTS SHALL CONFORM WITH ASTM A 307 SPECIFICATIONS AND SHALL HAVE A MINIMUM LENGTH OF 69.9 mm COUPLING NUTS SHALL BE GALVANIZED (ASTM A 123), OR ZINC PLATED (ASTM A 152)
3. EXTENSION STUDS SHALL BE 25.4 mm DIA. AND SHALL CONFORM TO ASTM A 307 SPECIFICATION. EXTENSION STUDS SHALL BE GALVANIZED (ASTM A 123), OR ZINC PLATED (ASTM A 153)
4. ATTACH COUPLING NUTS TO EXISTING ANCHOR BOLTS. INSTALL EXTENSION STUDS TO PROVIDE 127 mm PROJECTION ABOVE TOP OF NEW FOOTING. EXTEND AND/OR PLACE CONDUIT AS SHOWN. REINFORCING STEEL SHALL BE SPACED AS SHOWN. FORM AND CAST FOUNDATION EXTENSION WITH CLASS A(AE) CONCRETE.
5. REINSTALL BREAKAWAY BASE-PLATE BOTTOM AND SPACER PLATE ON EXTENDED ANCHOR BOLT LEVELING NUTS.
6. ERECT AND PLUMB POLE (SEE PLUMBING DETAIL) SLIP BOLT SHANKS MUST BE IN CONTACT WITH PLATES. TORQUE SLIP 122 N·m BOLTS TO RELEASE AND RETORQUE TO 188 N·m ADJUST LEVELING NUTS TO ALIGN TOP OF POLE VERTICALLY OVER CENTER OF BASE
7. GROUNTING TO BE DONE AFTER LIGHT POLE IS SECURED IN FINAL POSITION.
8. FOUNDATION EXTENSIONS, TO A MAXIMUM OF 762 mm, SHALL USE EXISTING CONDUIT AND JUNCTION BOX. CONDUIT SHALL BE EXTENDED AS SHOWN. JUNCTION BOX SHALL BE BROUGHT TO GRADE BY ADDITION OF JUNCTION BOX EXTENSIONS TO A MAXIMUM JUNCTION BOX DEPTH OF 914.4 mm BEYOND 914.4 mm A NEW JUNCTION BOX AND CONDUIT SYSTEM SHALL BE INSTALLED AS DETAILED.
9. JUNCTION BOXES NOT LOCATED AT LIGHT POLE SHALL BE BROUGHT TO GRADE BY ADDITION OF JUNCTION BOX EXTENSIONS TO A MAXIMUM JUNCTION BOX DEPTH OF 914.4 mm BEYOND 914.4 mm A NEW JUNCTION BOX SHALL BE INSTALLED.
10. ANY NEW CONDUIT REQUIRED SHALL BE ADDED IN A LENGTH AND CONFIGURATION NECESSARY TO COUPLE THE EXISTING CONDUIT THROUGH THE FOUNDATION EXTENSION

NO.	DATE	REVISIONS	REMARKS
1	06/27/96	B.A. CORRECT BAR DESIGNATION	

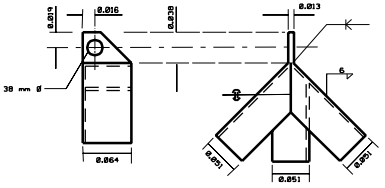
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

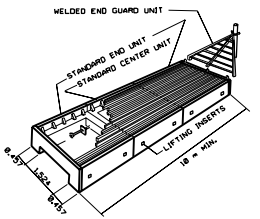
RECOMMENDED FOR APPROVAL: APR. 27, 1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED: APR. 27, 1999 DATE
DEPUTY DIRECTOR

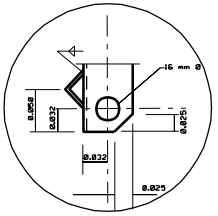
(METRIC)
STANDARD DRAWING TITLE
LIGHT POLE FOUNDATION EXTENSION

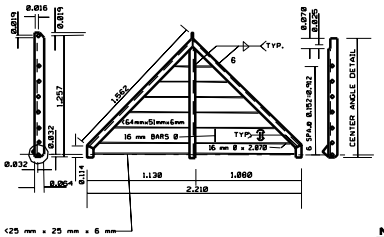
STD. DWG. NO.
755-7

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.









WELDED END GUARD UNIT
WT. W/BOLTS, U-CLAMP AND
PIPE POST 52.2 kg
(2 REQUIRED)

NOTES

1-ALL REINFORCING STEEL SHALL BE EPOXY COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO DESIGNATION M-284 AND M-31M GRADE 400.

2-ALL STRUCTURAL STEEL SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M-270 GRADE 250 AND SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M-111(ASTM A-123)

3-SOIL SHALL BE SUB-EXCAVATED 0.6 m AND BACKFILLED WITH GRANULAR BACKFILL BORROW AND COMPACTED.

4-ANY MODIFICATION REQUIRES APPROVAL.

5-CONCRETE SHALL BE CLASS AA(AE).

DESIGN DATA

MS 18(HS-20) LOADING IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATION
f'_c=10 MPa
f_s=160 MPa (REINFORCING STEEL)
f_s=138 MPa (STRUCTURAL STEEL)
n=8

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REVISIONS / REMARKS
1	08/14/97		CHANGED WIDTH TO MINIMUM OF GUARD UNIT

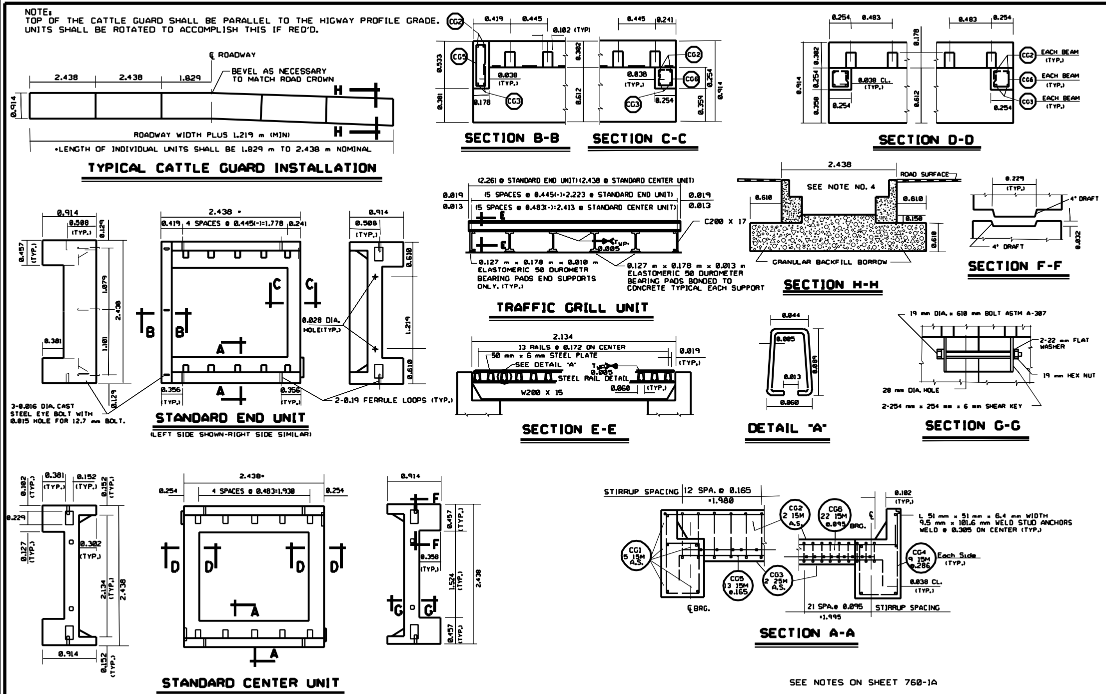
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — DATE
APPROVED
DEPUTY DIRECTOR — DATE

(METRIC)
STANDARD DRAWING TITLE
WELDED END GUARD UNIT

STD. DWG. NO.
760-1A

NOTE:
TOP OF THE CATTLE GUARD SHALL BE PARALLEL TO THE HIGWAY PROFILE GRADE. UNITS SHALL BE ROTATED TO ACCOMPLISH THIS IF REQ'D.



SEE NOTES ON SHEET 760-1A

REINFORCING STEEL SCHEDULE

MARK	LOCATION	SIZE NO.	NO. BARS	LENGTH	TOTAL LENGTH	SKETCH A	SKETCH B
CG1	CATTLE GUARD	15	10	2.362	23.620		
CG2	CATTLE GUARD	15	4	2.870	11.430	2.362	0.254
CG3	CATTLE GUARD	25	4	2.514	10.364	2.083	0.254
CG4	CATTLE GUARD	15	18	2.133	38.394		

MARK	LOCATION	SIZE NO.	NO. BARS	LENGTH	TOTAL LENGTH
CG5	CATTLE GUARD	15	13	1.270	16.510
CG6	CATTLE GUARD	15	22	.814	17.908

STRUCT. STEEL PER UNIT

ITEM	NO. REQ'D	SIZE	LENGTH
BEAM	4	W200 x 15	2.134
CHANNEL	2	C200 x 17	2.134
RAIL/END UNIT	13		2.286
RAIL/CENTER UNIT	13		2.438
ANGLE	2	L51 x 51 x 6.4	2.438
STUD ANCHOR	16	10 mm DIA.	0.102

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE		REMARKS
1	10/14/97		EXTENDED GRANULAR BACKFILL BORROW AREA IN SECTION H-H
2	04/27/99	B.A.	CORRECT BAR DESIGNATION

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.27,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.27,1999 DATE
DEPUTY DIRECTOR

(METRIC)
PRECAST CONCRETE CATTLE GUARD
STANDARD DRAWING TITLE

STD. DWG. NO.
760-1B

R METERS	Vd = 30 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 40 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 50 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 60 km/h L (METERS) %	TWO LANES	FOUR LANES
7000	NC	0	0	NC	0	0	NC	0	0	NC	0	0
5000	NC	0	0	NC	0	0	NC	0	0	NC	0	0
3000	NC	0	0	NC	0	0	NC	0	0	NC	0	0
2500	NC	0	0	NC	0	0	NC	0	0	NC	0	0
2000	NC	0	0	NC	0	0	NC	0	0	NC	0	0
1500	NC	0	0	NC	0	0	NC	0	0	NC	0	0
1400	NC	0	0	NC	0	0	NC	0	0	NC	0	0
1300	NC	0	0	NC	0	0	NC	0	0	RC	33	50
1200	NC	0	0	NC	0	0	NC	0	0	RC	33	50
1000	NC	0	0	NC	0	0	RC	28	42	2.1	33	50
900	NC	0	0	NC	0	0	RC	28	42	2.3	33	50
800	NC	0	0	NC	0	0	RC	28	42	2.5	33	50
700	NC	0	0	RC	22	33	2.1	28	42	2.8	33	50
600	NC	0	0	RC	22	33	2.4	28	42	3.1	33	50
500	NC	0	0	2.1	22	33	2.8	28	42	3.5	33	50
400	RC	17	26	2.5	22	33	3.3	28	42	4.0	33	50
300	RC	17	26	3.1	22	33	3.9	28	42	4.6	33	50
250	2.3	17	26	3.5	22	33	4.2	28	42	5.0	33	50
200	2.8	17	26	3.9	22	33	4.7	28	42	5.5	33	50
175	3.0	17	26	4.1	22	33	5.0	28	42	5.8	35	52
150	3.3	17	26	4.4	23	34	5.3	29	43	5.9	35	53
140	3.5	17	26	4.5	24	35	5.4	29	44	6.0	36	54
130	3.6	17	26	4.6	24	36	5.6	30	45	R min = 135		
120	3.8	18	27	4.8	25	37	5.7	31	46			
110	3.9	19	28	5.0	26	39	5.8	31	47			
100	4.1	20	29	5.2	27	40	5.9	32	48			
90	4.2	20	30	5.4	28	42	6.0	32	49			
80	4.5	22	32	5.6	29	43	R min = 90					
70	4.7	23	34	5.8	30	45						
60	5.0	24	36	6.0	31	46						
50	5.4	26	39	R min = 55								
40	5.8	28	42									
30	6.0	29	43									
	R min = 30											

R METERS	Vd = 70 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 80 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 90 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 100 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 110 km/h L (METERS) %	TWO LANES	FOUR LANES	Vd = 120 km/h L (METERS) %	TWO LANES	FOUR LANES
7000	NC	0	0	NC	0	0	NC	0	0	NC	0	0	NC	0	0	NC	0	0
5000	NC	0	0	NC	0	0	NC	0	0	NC	0	0	NC	0	0	NC	0	0
3000	NC	0	0	NC	0	0	NC	0	0	RC	56	84	RC	61	92	2.3	67	101
2500	NC	0	0	NC	0	0	RC	50	75	RC	56	84	2.3	61	92	2.7	67	101
2000	NC	0	0	RC	44	66	2.1	50	75	2.5	56	84	2.8	61	92	3.3	67	101
1500	RC	39	59	2.2	44	66	2.7	50	75	3.1	56	84	3.6	61	92	4.2	67	101
1400	RC	39	59	2.4	44	66	2.8	50	75	3.3	56	84	3.8	61	92	4.4	67	101
1300	2.1	39	59	2.5	44	66	3.0	50	75	3.5	56	84	4.0	61	92	4.7	67	101
1200	2.2	39	59	2.7	44	66	3.2	50	75	3.7	56	84	4.2	61	92	5.0	67	101
1000	2.6	39	59	3.1	44	66	3.6	50	75	4.2	56	84	4.8	61	92	5.5	67	101
900	2.8	39	59	3.4	44	66	3.9	50	75	4.5	56	84	5.1	61	92	5.8	67	101
800	3.1	39	59	3.6	44	66	4.2	50	75	4.9	56	84	5.4	61	92	6.0	67	101
700	3.4	39	59	4.0	44	66	4.6	50	75	5.2	56	84	5.7	61	92	R min = 755		
600	3.8	39	59	4.3	44	66	5.0	50	75	5.6	56	84	6.0	61	92			
500	4.2	39	59	4.8	44	66	5.4	50	75	5.9	56	84	R min = 560					
400	4.7	39	59	5.3	44	66	5.9	50	75	R min = 435								
300	5.4	39	59	5.9	44	66	R min = 335											
250	5.7	39	59	6.0	44	66												
200	6.0	39	59	R min = 250														
175	R min = 195																	

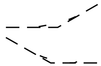
DESIGN WIDTHS OF PAVEMENT FOR TURNING ROADWAYS (m)

EXCLUSIVE TURN LANES AND RAMPS									
RADIUS ON INNER EDGE OF PAVEMENT R (m)	CASE I ONE-LANE, ONE-WAY OPERATION- NO PROVISION FOR PASSING A STALLED VEHICLE			CASE II ONE-LANE, ONE-WAY OPERATION- WITH PROVISION FOR PASSING A STALLED VEHICLE			CASE III TWO-LANE OPERATION- EITHER ONE-WAY OR TWO-WAY		
	DESIGN TRAFFIC CONDITION								
	A	B	C	A	B	C	A	B	C
	PAVEMENT WIDTH (METERS)								
15	5.4	5.4	6.9	6.9	7.5	8.7	9.3	10.5	12.6
25	4.8	5.1	5.7	6.3	6.9	8.1	8.7	9.9	11.1
30	4.5	4.8	5.9	6.0	6.6	7.5	8.4	9.3	10.5
45	4.2	4.8	5.1	5.7	6.3	7.2	8.1	9.0	9.9
60	3.9	4.8	4.8	5.7	6.3	6.9	8.1	8.7	9.3
90	3.9	4.5	4.8	5.4	6.0	6.6	7.8	8.4	9.0
120	3.9	4.5	4.8	5.4	6.0	6.6	7.8	8.4	8.7
150	3.6	4.5	4.5	5.4	6.0	6.6	7.8	8.4	8.7
TANGENT	3.6	4.5	4.5	5.1	5.7	6.3	7.5	8.1	8.1
WIDTH MODIFICATION REGARDING EDGE OF PAVEMENT TREATMENT:									
NO STABILIZED SHOULDER	NONE			NONE			NONE		
MOUNTABLE CURB	NONE			NONE			NONE		
BARRIER CURB: ONE SIDE	ADD 0.3 m			NONE			ADD 0.3 m		
BARRIER CURB: TWO SIDES	ADD 0.6 m			ADD 0.3 m			ADD 0.6 m		
STABILIZED SHOULDER, ONE OR BOTH SIDES	NONE			DEDUCT SHOULDER WIDTH; MINIMUM PAVEMENT WIDTH AS UNDER CASE I			DEDUCT 0.6 m WHERE SHOULDER IS 1.2 m WIDER		

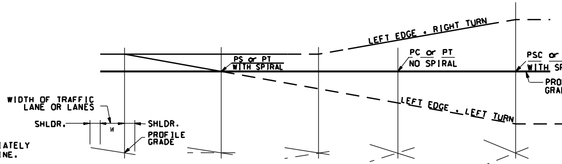
NOTE: TRAFFIC CONDITION A = PREDOMINANTLY P VEHICLES, BUT SOME CONSIDERATION FOR SU TRUCKS.
TRAFFIC CONDITION B = SUFFICIENT SU VEHICLES TO GOVERN DESIGN, BUT SOME CONSIDERATION FOR SEMITRAILER VEHICLES.
TRAFFIC CONDITION C = SUFFIENT BUS AND COMBINATION - TYPES OF VEHICLES TO GOVERN DESIGN.

INSTRUCTIONS

1. SPIRALS WITH CURVES ARE NOT REQUIRED BUT MAY BE DESIRABLE UNDER HIGH SPEEDS AND SHARP CURVES. WHEN A SPIRAL IS USED, THE LENGTH OF SPIRAL IS EQUAL TO MINIMUM TRANSITION LENGTHS.
2. ADJUST THE 0.6 L AND 0.4 L DIMENSIONS (SEE PROFILE SKETCH) SO THAT THE BEGIN AND END POINTS OF THE TRANSITION FALL ON EVEN, 20 m INTERVALS.
3. THE LAST LINE OF EACH SECTION OF THE TABLE SHOWS MINIMUM RADIUS FOR THE GIVEN SPEED.
4. SUPERELEVATE SURFACED SHOULDERS SHALL BE AT SAME RATE AS TRAFFIC LANES.
5. PLACE THE FOLLOWING INFORMATION ON THE CONSTRUCTION PLANS.
   RATE OF SUPERELEVATION
   BEGIN AND END OF TANGENT RUNOUT
   BEGIN AND END OF TRANSITION IF SPIRALS ARE NOT USED

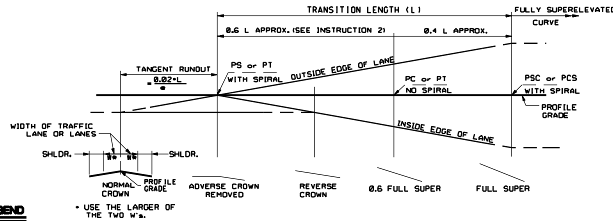


NOTE: ANGULAR BREAKS TO BE APPROPRIATELY ROUNDED AS SHOWN BY DOTTED LINE.



PROFILE - SINGLE CROWN ROAD

(FOR ONE-DIRECTION ROADWAY CROSS - SECTION ONLY)



PROFILE - DOUBLE CROWN ROAD

LEGEND

V - DESIGN SPEED
R - RADIUS OF CURVE - (METERS)
e - SUPERELEVATION - %
W - CROSS SECTIONAL DISTANCE IN METERS FROM AXIS OF ROTATION (NORMALLY THE CONTROL LINE) TO THE OUTER EDGE OF THE TRAFFIC LANE OR LANES.
L - TRANSITION LENGTH - m (METERS)
NC= NORMAL CROWN
RC= REVERSE CROWN (REMOVE ADVERSE CROWN AND SUPERELEVATE AT NORMAL CROWN)

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	REVISIONS	REMARKS
1	09/29/99	BA	CORRECT ERROR IN Vd=40, R=60 VALUE

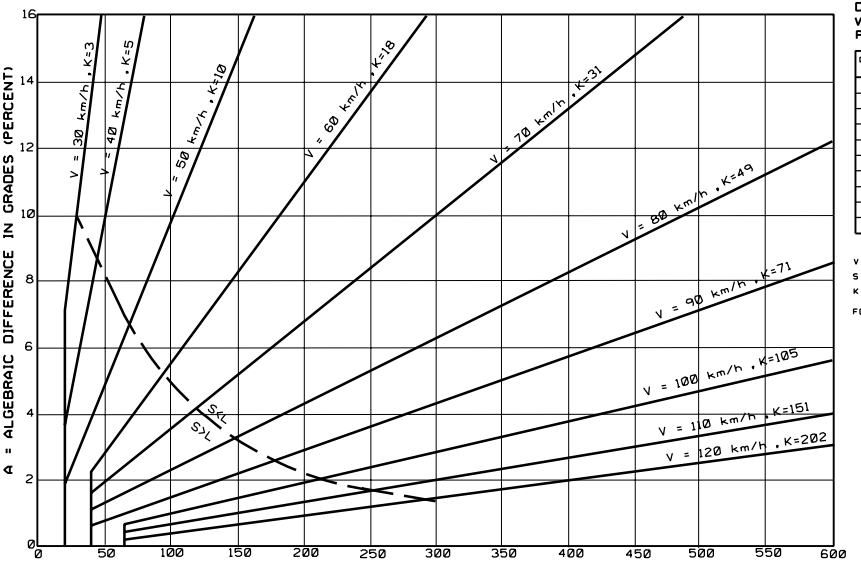
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — DEC 14, 1999 DATE
APPROVED — DEPUTY DIRECTOR — DEC 14, 1999 DATE

(METRIC)
SUPERELEVATION AND WIDENING
STANDARD DRAWING TITLE

STD. DWG. NO.
805-1

DESIGN CONTROLS FOR CREST VERTICAL CURVES, FOR MINIMUM STOPPING SIGHT DISTANCE AND OPEN ROAD CONDITIONS.



DESIGN CONTROLS FOR CREST VERTICAL CURVES BASED ON PASSING SIGHT DISTANCE.

DESIGN SPEED km/h	MINIMUM PASSING SIGHT DISTANCE (m)	K (DESIREABLE)
30	220	50
40	285	90
50	345	130
60	410	180
70	485	250
80	545	310
90	605	390
100	670	480
110	730	570
120	795	670

V = DESIGN SPEED - km/h
S = MIN. STOPPING SIGHT DISTANCE - METER
K = CONSTANT

FORMULA L = KA

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	BY	REMARKS
1	8/27/99	B.A.	ADD DIMENSION NOTE

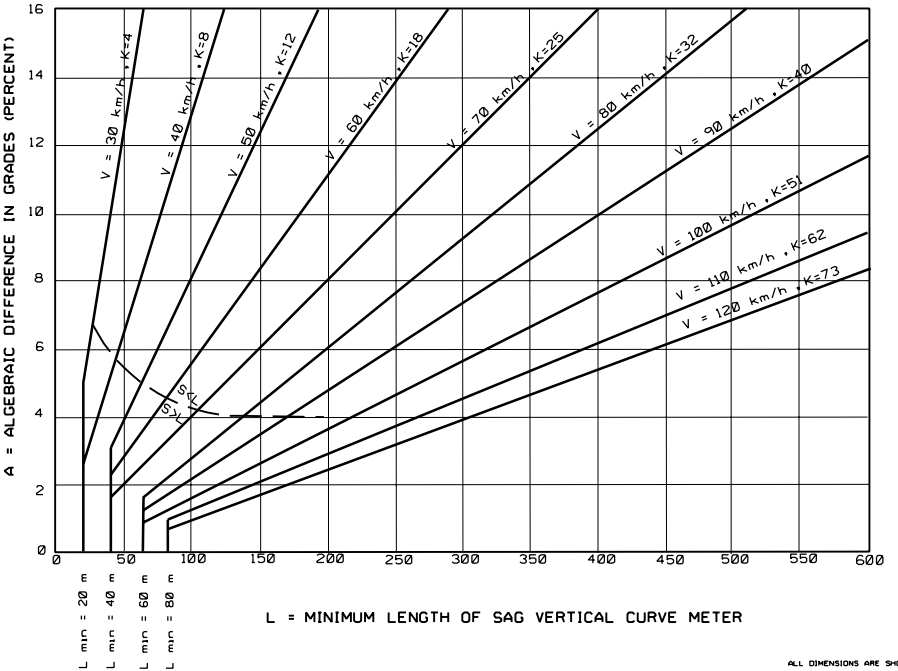
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
COMMITTEE CHAIRMAN — APRIL 27, 1999 DATE
APPROVED
STANDARDS COMMITTEE — APRIL 27, 1999 DATE
DEPUTY DIRECTOR — APR. 27, 1999 DATE

(METRIC)
DESIGN CONTROL FOR CREST VERTICAL CURVES
STANDARD DRAWING TITLE

STD. DWG. NO.
805-2

DESIGN CONTROLS FOR SAG VERTICAL CURVES, OPEN ROAD CONDITIONS.



ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

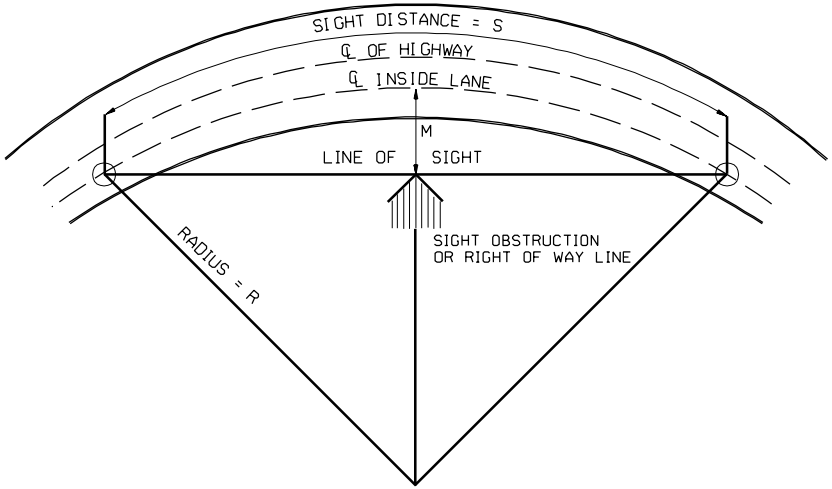
NO.	DATE	APPR.	REMARKS
1	8/27/98	B.A.	ADD DIMENSION NOTE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DATE APRIL 27, 1999
CHAIRMAN STANDARDS COMMITTEE
APPROVED — DATE APRIL 27, 1999
DEPUTY DIRECTOR

(METRIC)
DESIGN CONTROL FOR SAG VERTICAL CURVES
STANDARD DRAWING TITLE

STD. DWG. NO.
805-2A



$$M = R\left(1-\cos\frac{90\,S}{3.14\,R}\right)$$

$$\text{AND}\quad S = \frac{3.14\,R}{90}\cos^{-1}\frac{R-M}{R}$$

S = STOPPING SIGHT DISTANCE (m)
M = MIDDLE ORDINATE (m)
R = RADIUS (m)

DESIGN SPEED (km/h)	STOPPING SIGHT DISTANCE (m)	MIN. PASSING SIGHT DISTANCE (m)
30	29.6	217
40	44.4	285
50	57.4-62.8	345
60	74.3-84.6	407
70	94.1-110.8	482
80	112.8-139.4	541
90	131.2-168.7	605
100	157.0-205.0	670
110	179.5-246.4	728
120	202.9-285.6	792

STOPPING SIGHT DISTANCE AASHTO: FIGURES III-24A AND III-24B

PASSING SIGHT DISTANCE AASHTO TABLE III-5

NOTE :

WHEN THE NEEDED STOPPING SIGHT DISTANCE WOULD NOT BE AVAILABLE BECAUSE THE RAILING OR A LONGITUDINAL BARRIER CONSTITUTES THE OBSTRUCTION, ALTERNATIVES SHOULD BE CONSIDERED FOR BOTH SAFETY AND ECONOMIC REASONS. THE ALTERNATES ARE: INCREASE THE OFFSET TO THE OBSTRUCTION, INCREASE THE RADIUS OR REDUCE THE DESIGN SPEED (DESIGN EXCEPTION REQUIRED). HOWEVER, ANY ALTERNATIVE SELECTED SHOULD NOT REQUIRE THE WIDTH OF THE SHOULDER ON THE INSIDE OF THE CURVE TO EXCEED 3.6 m BECAUSE THE POTENTIAL EXISTS THAT DRIVERS WILL USE THE SHOULDERS IN EXCESS OF THAT WIDTH AS A PASSING OR TRAVEL LANE.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	04/27/99	B.A.	CORRECT DIMENSION NOTE
2	10/31/00	F.W.	DELETED GRAPH, REVISED TABLE AND ADDED NOTE.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

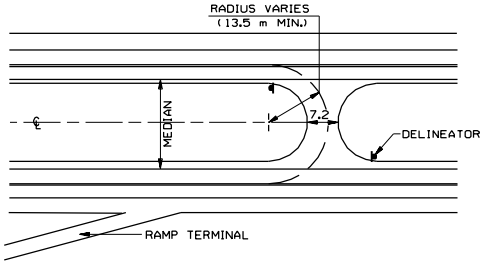
RECOMMENDED FOR APPROVAL — DEC.12.2000 DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED — DEC.12.2000 DATE
DEPUTY DIRECTOR

(METRIC)

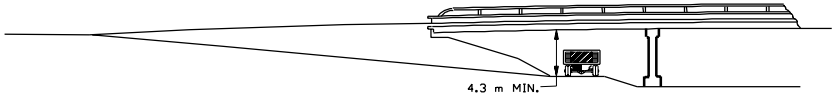
STANDARD DRAWING TITLE

SIGHT DISTANCE ON HORIZONTAL CURVES

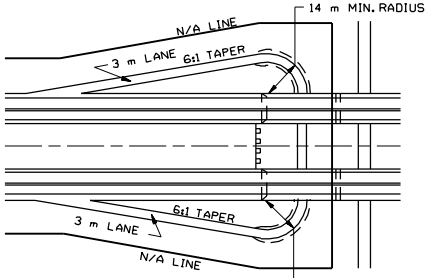
STD. DWG. NO.
805-2B



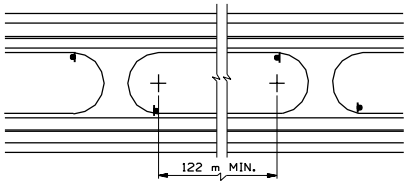
TYPE "A"



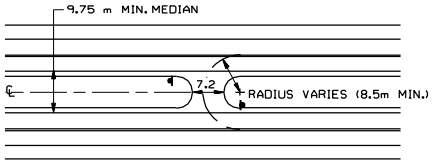
TYPE "B"
(ELEVATION)



TYPE "B"
(PLAN)



DOUBLE CROSSOVER
SEE NOTE NO. 8



TYPE "C"

NOTES

1. MAINTENANCE TURN AROUNDS (TYPES A AND B) ARE TO BE PROVIDED AT INTERCHANGES WHERE SNOW AND ICE REMOVAL WOULD BE SIGNIFICANTLY FACILITATED THEREBY.

2. EMERGENCY TURN AROUNDS OF TYPE SHOWN ON PLANS, STRICTLY CONTROLLED AND FAVORABLY LOCATED AT A POINT OF OPTIMUM SIGHT DISTANCE, ARE TO BE PROVIDED FOR EMERGENCY (POLICE AMBULANCE, ETC.) VEHICLES AND OTHER EMERGENCY CONDITIONS:
   (A) NEAR MIDPOINT WHERE INTERCHANGES ARE FIVE TO TEN KILOMETERS APART.
   (B) AT APPROXIMATELY 5 km INTERVALS WHERE INTER-CHANGES ARE GREATER THAN 10 km APART.

3. THE MEDIAN CROSSOVER AREA SHOULD BE CONSTRUCTED TO APPEAR INCONSPICUOUS BY FLATTENING OF SLOPES, AND USING GRAVEL ONLY FOR SURFACING.

4. FOR R/W CRITERIA SEE NOTE NO. 7 OF STD. DWG. NO. 815-1.

5. PROVIDE ONE METER PAVEMENT WIDENING ON CURVE OF TYPE B BEGINNING AT PC AND ENDING AT PT TO PROVIDE FOR REAR WHEEL OFF TRACKING.

6. THE GEOMETRICS AS SHOWN FOR TYPES A AND B ARE BASED ON TURNING RADII FOR AASHTO SINGLE UNIT TRUCK OR BUS. EACH TYPE REQUIRES THE MINIMUM MEDIAN WIDTH SHOWN ON THE DRAWING.

7. THE GEOMETRICS AS SHOWN FOR TYPE C ARE BASED ON THE TURNING RADII FOR AN AASHTO PASSENGER VEHICLE. IT REQUIRES A MINIMUM OF 9.75 METER MEDIAN WIDTH.

8. INSTALL DOUBLE CROSSINGS (OVERLAPPING) AT SHED CONTROL AREA BOUNDARIES.

9. PLACE DELINEATION ON FAR SIDE OF TURNAROUND. SEE STANDARD DRAWING 726-4.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	BY	REMARKS
1	02/18/98		NOTE 9 CHANGED .TO REFLECT NEW DRAWING NUMBER.
			LINE STYLE CORRECTED IN DOUBLE CROSSOVER DETAIL.
2	02/28/01	JJB	REVISED NOTE 4 CORRECTING NOTE CALLOUT TO STD.DWG.815-1.

UTAH DEPARTMENT OF TRANSPORTATION
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SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL		MAR 13 2001 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED		MAR 13 2001 DATE
DEPUTY DIRECTOR		

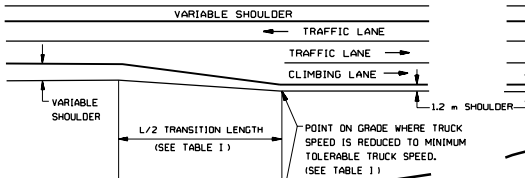
(METRIC)

FREEWAY
TURN AROUNDS

STANDARD DRAWING TITLE

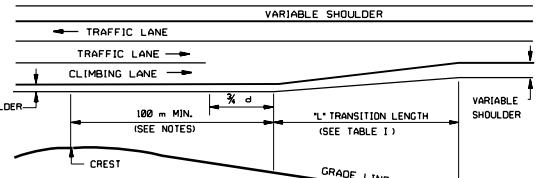
STD. DWG. NO.
805-3

PLAN



PROFILE

PLAN



PROFILE

TABLE I

DESIGN SPEED km/h	AVERAGE RUNNING SPEED km/h	MIN. TRUCK SPEED km/h	"L" TRANSITION LENGTH	L/2 TRANSITION LENGTH
50	45	21	60	30
60	58	34	85	42
70	65	40	150	75
80	71	47	180	90
100	84	48	230	115
110	93	48	250	125
120	103	48	275	137

NOTES

S.D = PASSING SIGHT DISTANCE AND T.= DUAL WHEEL TRUCKS.
THE 50% REFERS TO PASSING SIGHT DISTANCE GREATER OR LESS THAN 50% OF THE ENTIRE LENGTH OF GRADE.

TABLE II

WARRANTS FOR CLIMBING LANE ON TWO LANE HIGHWAYS							
GRADE %	km LENGTH OF GRADE	DHV T = 5 50%>SD	DHV T = 5 50%<SD	DHV T = 10 50%>SD	DHV T = 10 50%<SD	DHV T = 15 OR MORE 50%>SD	DHV T = 15 OR MORE 50%<SD
3 TO 4	0.8 TO 1.6	500	350	400	300	300	200
3 TO 4	OVER 1.6	400	300	250	150	200	150
4 TO 5	0.6 TO 1.6	400	250	250	150	200	120
4 TO 5	OVER 1.6	350	200	250	120	150	100
OVER 5%	0.5 TO 1.6	250	150	150	120	120	100
OVER 5%	OVER 1.6	200	120	120	100	120	100

TABLE III

km/h	METERS (g)
30	55
40	75
50	100
60	125
70	170
80	190
90	215
100	240
110	260

NOTES :

1 - CLIMBING LANE REQUIRED ON 2 LANE ROADWAY WHEN TRUCK SPEED IS REDUCED TO MINIMUM TRUCK SPEED (TABLE I) AND DESIGN HOURLY VOLUMES EXCEED THOSE SHOWN IN TABLE II

2 - CLIMBING LANE SHALL BE CARRIED A MINIMUM OF 100 m OVER CREST, PROVIDED MINIMUM PASSING SIGHT DISTANCE IS AVAILABLE. IF PASSING SIGHT DISTANCE IS RESTRICTED DUE TO HORIZONTAL OR VERTICAL ALIGNMENT, THE CLIMBING LANE SHALL BE EXTENDED TO THE POINT WHERE MINIMUM PASSING SIGHT DISTANCE BECOMES AVAILABLE, PROVIDED TRUCK SPEED IS ABOVE MINIMUM TOLERABLE TRUCK SPEED AT THAT POINT. OTHERWISE EXTEND CLIMBING LANE TO POINT WHERE MINIMUM TOLERABLE TRUCK SPEED IS EXCEEDED.

3 - CLIMBING LANE REQUIRED ON MULTI-LANE ROADWAY WHEN TRUCK SPEED IS REDUCED BELOW MINIMUM TOLERABLE TRUCK SPEED AND ASSIGNING ALL PASSENGER VEHICLES TO THE INNER LANE OR LANES, THE VOLUME EXCEEDS THE DESIGN CAPACITY OF THE REMAINING LANES.

4 - WHEN TWO OR MORE CLIMBING LANE SECTIONS ARE JUSTIFIED IN CLOSE PROXIMITY, THE CLIMBING LANE SHALL BE CONTINUOUS IF THE SECTIONS BETWEEN WOULD BE LESS THAN 0.8 km IN LENGTH.

5 - WHEN THE VOLUME OF THE PROPOSED HIGHWAY APPROACHES THE VALUE WHICH WOULD WARRANT A 4-LANE SECTION AND SUBSEQUENT IMPROVEMENT TO 4-LANE IS ANTICIPATED SHORTLY AFTER THE INITIAL DESIGN YEAR, A 4-LANE SECTION SHALL BE PROVIDED INITIALLY IN PLACE OF CLIMBING LANES.

6 - CLIMBING LANE OF LESS THAN 300 m SHALL BE OMITTED.

7 - WHERE THERE IS OVER 1.6 km OF NO PASSING SIGHT DISTANCE, PROVIDE MINIMUM 300 m PASSING LANE FOR EACH 1.6 km WHERE DHV EXCEEDS 80.

8 - FOR TRAFFIC CONTROL SEE STANDARD DRAWING 746-46

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO	DATE	APPR.	REMARKS
1	03/23/00	M.C.	REVISED TABLE I. ADDED NOTE 8. ADDED TABLE III AND ADDED DIMENSION IN RIGHT PLAN DETAIL.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DATE: APR.11.2000
CHAIRMAN STANDARDS COMMITTEE APPROVED — DATE: APR.11.2000
DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE

CLIMBING LANES

STD. DWG. NO.
810-5A

FIGURE I DECELERATION

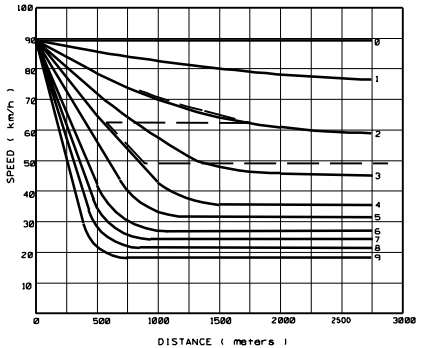


FIGURE II ACCELERATION

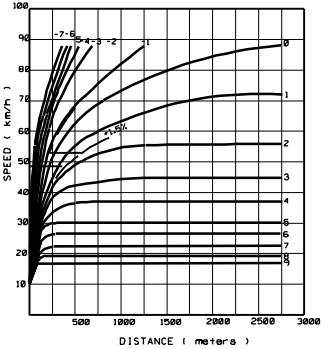
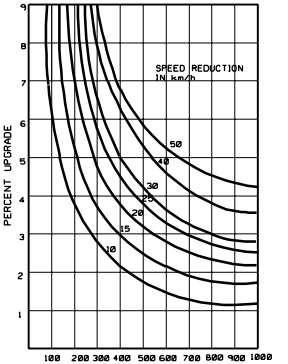


FIGURE III



LENGTH OF GRADE IN (meters)
CRITICAL LENGTHS GRADE FOR DESIGN

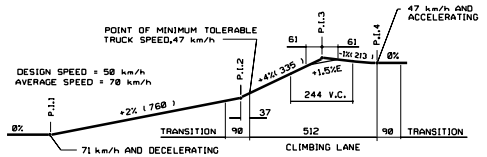
EXAMPLE OF USE OF CURVES

(FIGURES I AND II)

(1) DASHED LINES ON GRAPH INDICATE STEPS TO FIND PROPER LENGTH AND LOCATION OF CLIMBING LANE SHOWN ON SKETCH.

(2) a. WHEN A.D. < 4% THE V.C. IS IGNORED AND THE DISTANCE BETWEEN P.I.'S ARE USED.
b. WHEN A.D. > 4% THE V.C. SHOULD BE APPROXIMATED BY THE USE OF AN AVERAGE GRADE CONNECTING THE QUARTER POINTS ON THE SEMI-TANGENTS OF THE V.C. (SEE P.I.3 ON SKETCH).

A.D. = ALGEBRAIC DIFFERENCE.



EXAMPLE

NOTES

1 - FIGURE I SHOWS HOW FAR A TYPICAL HEAVY TRUCK TRAVELS UP VARIOUS GRADES OR COMBINATION OF GRADES BEFORE A CERTAIN LOWER SPEED IS REACHED.

2 - FIGURE II SHOWS PERFORMANCE WHEN THE TRUCK APPROACHES THE GRADE AT OR BELOW CRAWL SPEED

3 - FIGURE III GIVES THE CRITICAL LENGTH OF GRADE RELATED TO PERCENT UPGRADE AND SPEED REDUCTION

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | DATE | APPR. | REMARKS

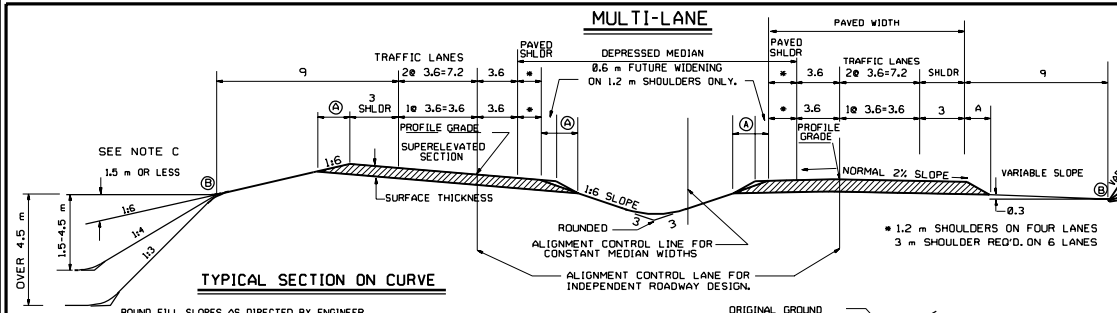
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED: DATE
DEPUTY DIRECTOR DATE

(METRIC)
STANDARD DRAWING TITLE
CLIMBING LANES EXAMPLE

STD. DWG. NO.
810-58

MULTI-LANE



TYPICAL SECTION ON CURVE

ROUND FILL SLOPES AS DIRECTED BY ENGINEER

TYPICAL SECTION ON TANGENT

PROVIDE BACKSLOPE ROUNDING FOR ALL CUTS STEEPER THAN 1:4 AS PER SLOPE ROUNDING DETAIL, OR AS OTHERWISE DIRECTED BY THE ENGINEER.

VARIABLE SLOPE AS REQ'D. FOR ROCK CUTS.
1:2 FOR SOIL CUTS OVER 6 m
1:4 FOR SOIL CUTS TO 3 m TO 6 m
1:6 FOR CUTS UP TO 3 m (INCLUDING BEDROCK)
SEE NOTE "C"

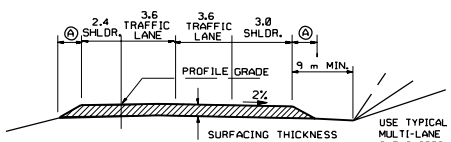
SURFACE DITCH REQ'D. WHEN SURFACE DRAINAGE IS TOWARDS CUT.

TYPICAL SLOPES

A. A FIXED WIDTH TO BE ESTABLISHED TO THE NEAREST 0.15 m TO REMAIN CONSTANT EVEN UNDER CONDITIONS OF SUPERELEVATION PROVIDING A SLOPE OF NOT LESS THAN 1:6 THROUGHOUT EACH INDIVIDUAL PROJECT AS DETERMINED BY REQUIRED SURFACING THICKNESS.

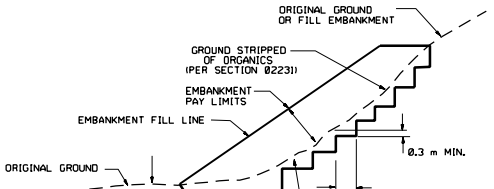
B. A MINIMUM 9 m HINGE POINT TO BE MAINTAINED REGARDLESS OF SURFACING THICKNESS. SEE NOTE: 11

C. IN RUGGED TERRAIN STEEPER CUT AND FILL SLOPES WILL BE REQUIRED WHEN EXCESSIVE QUANTITIES WOULD RESULT WITH SPECIFIED SLOPES. SLOPES USED SHOULD BE STABLE AS DETERMINED BY GEOLOGICAL AND SOIL INVESTIGATION. SLOPES ARE ALSO SUBJECT TO VARIATION AS MAY BE RECOMMENDED WHERE EXISTING RIGHT OF WAY IS RESTRICTIVE AND COSTS FOR PROVIDING ADDITIONAL RIGHT OF WAY WOULD BE EXCESSSIVE. WHERE A DESIGN EXCEPTION TO THE DITCH WIDTH SHOWN IS TO BE CONSIDERED FOR ROCK CUTS OVER 3 m, ROCKFALL CATCHMENT ANALYSIS WILL BE REQUIRED (SUCH AS RICHIE-1963), WITH DITCH WIDTH CONFORMING ACCORDINGLY.



ALTERNATE SECTION ON TANGENT

SEE NOTE 6

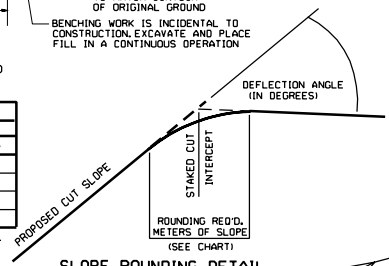


BENCHED SLOPE DETAIL

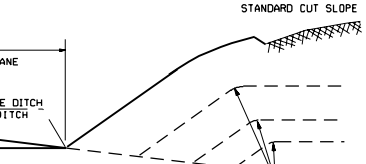
REQUIRED WHEN FILL TO BE PLACED ON ANY SLOPE STEEPER THAN 1:4

SLOPE ROUNDING CHART					
		SLOPE HEIGHT (m)			
		2-5	5-10	10-20	20+
DEFLECTION ANGLE (deg.)	10-20	1.5	2	2.5	3
	20-30	3.0	4	5.0	6
	30-40	4.5	6	7.5	9
	40+	6.0	8	10.0	12

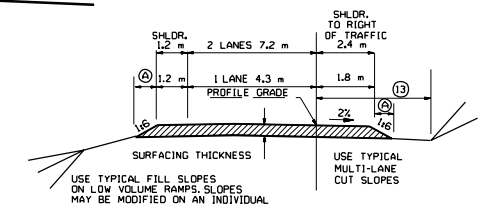
SLOPE ROUNDING REQUIRED FOR THE SIDES OF CUT SLOPES AS WELL TOP OF CUT SLOPES.



SLOPE ROUNDING DETAIL



CUT DITCH FLARING



TYPICAL RAMP

NOTES:

1. ROADWAY DESIGNS SHALL BE CORRELATED WITH MANUAL OF INSTRUCTION ROADWAY DESIGN MANUAL UTAH STATE DEPARTMENT OF TRANSPORTATION.
2. CURVATURE AND SUPERELEVATION SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 805-1.
3. NORMAL INDEPENDENT ROADWAY DESIGN SHALL BE UTILIZED WITH A VARIABLE WIDTH MEDIAN. WHEN INDEPENDENT ROADWAY IS NOT ADAPTABLE TO TERRAIN CONDITIONS A UNIFORM WIDTH DEPRESSED MEDIAN SHALL BE DESIGNED AS WIDE AS PRACTICAL
4. FOR DETERMINATION OF MEDIAN BARRIERS SEE SEC. IV ON MEDIAN BARRIERS IN AASHTO GUIDE FOR SELECTING, LOCATING AND DESIGNING TRAFFIC BARRIERS.
5. SUFFICIENT LANES SHALL BE PROVIDED TO GIVE ADEQUATE CAPACITY FOR DHV AT DESIGN YEAR. WHEN STAGE CONSTRUCTION IS PROPOSED FOR TWO LANE ONLY INITIAL LANES SHALL BE CONSTRUCTED TO THE GEOMETRICS AND CROSS SLOPE REQUIRED FOR THE ULTIMATE DESIGN. THE TWO LANED CROWN SECTIONS WILL BE DESIGNED IF ADDITIONAL LANES ARE NOT WARRANTED UNTIL AFTER DESIGN YEAR.
6. ALTERNATE TYPICAL TO BE USED WHERE MEDIANS ARE LESS THAN 20 m WIDE AND WHERE SECTIONS OF LESS THAN 8km IN LENGTH EXIST BETWEEN SECTIONS OF COMPLETED ROADWAY.
7. THE MINIMUM R/W CLEARANCE SHALL BE 6 m OUTSIDE THE TOE OF FILL SLOPES 9 m OUTSIDE THE TOP OF CUT SLOPE FOR THROUGH HIGHWAYS AND RAMP & 3 m FOR FRONTAGE ROADS.
8. ON BRIDGE APPROACHES GRADE OUTSIDE EMBANKMENT AND MEDIANS TO CONFORM TO STRUCTURES PLAN.
9. NORMAL MEDIAN SLOPE SHALL BE 1:6 UNDER CONDITIONS OF SUPERELEVATION OR SPECIAL DRAINAGE REQUIREMENTS. THE MEDIAN SLOPES SHALL VARY TO PROVIDE A FLOW LINE 300 mm BELOW SUBGRADE. MEDIAN FLOW LINE MAY BE SHIFTED HORIZONTAL EQUALIZE ADJACENT SLOPES.
10. TYPICAL FILL SLOPES AND CUT SLOPES SHALL COMPLY WITH WIDE MEDIAN & INDEPENDENT ROADWAY DESIGN.
11. SURFACING THICKNESS CONSIDERED TO CONSIST OF UNTREATED BASE COURSE, AND HARD SURFACING MATERIAL ONLY. NO GRANULAR MATERIAL TO BE FIGURED IN SURFACING THICKNESS DIMENSION.
12. TRANSITIONS FROM LESSER TO STEEPER CUT AND FILL SLOPES SHALL BE MADE IN SUFFICENT DISTANCE SO AS TO PROVIDE A NATURAL PLEASING APPERANCE.
13. DESIGN SPEED CHANGES THROUGHOUT LENGTH OF RAMP, REFER TO THE ROADSIDE DESIGN GUIDE (CURRENT EDITION) FOR APPLICABLE CLEAR ZONE DISTANCE.

	DESIGN SPEED (km/h)			
	80	100	110	120
MAXIMUM GRADE - FLAT TERRAIN	4	3	3	3
MAXIMUM GRADE - ROLLING TERRAIN	5	4	4	4
MAXIMUM GRADE - MOUNTAINOUS TERRAIN	6	6	5	-
MINIMUM CURVE RADIUS	250	435	560	755

STOPPING SIGHT DISTANCE: SEE STANDARD DRAWING 805-20

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	12/14/00	J.H.	CHANGED STEPPED SLOPE DETAIL TO BENCHED, CORRECTED ROUNDING & SURFACE DITCH NOTE, NOTE "C" OF TYPICAL FILL SLOPES AND SPELLING IN NOTE 10, AND ADDED NOTE 12.
2	02/22/01	F.A.M.	REVISED "TYPICAL RAMP" DETAIL AND ADDED NOTE 13 DEFINING CLEAR ZONE FOR RAMP.
3	03/29/01	J.H.	REVISED DETAIL REVISED SLOPE ROUNDING NOTES.
4	04/10/01	F.A.M.	REMOVED SLOPE NOTE FROM TYPICAL SECTION ON CURVE AND TO THE RIGHT OF "CUT DITCH FLARING"

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

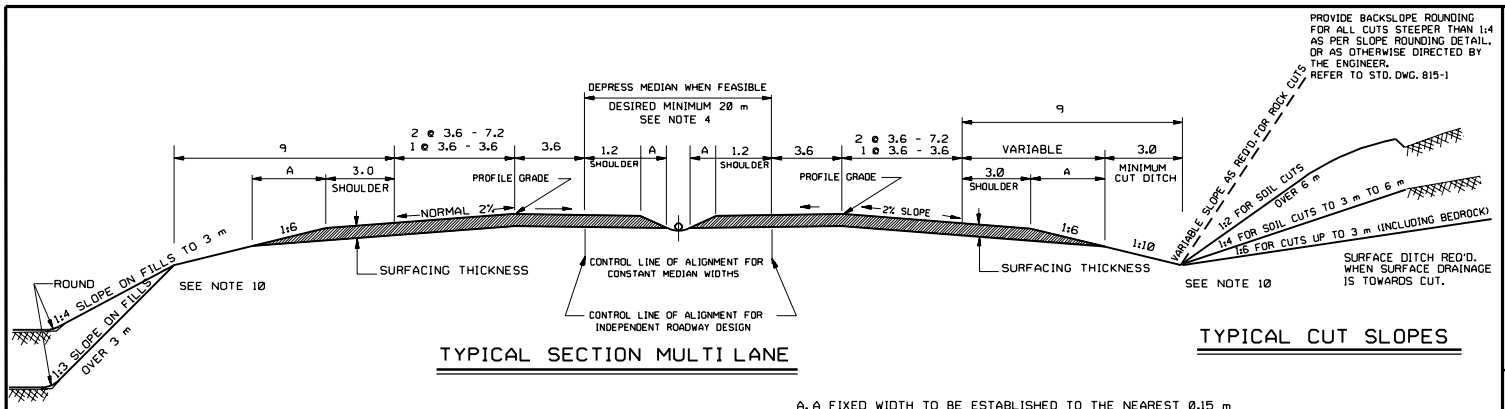
RECOMMENDED FOR APPROVAL — APR.10.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.10.2001 DATE
DEPUTY DIRECTOR

(METRIC)

GEOMETRIC DESIGN STANDARDS FOR FREEWAYS (ROADWAY)

STANDARD DRAWING TITLE

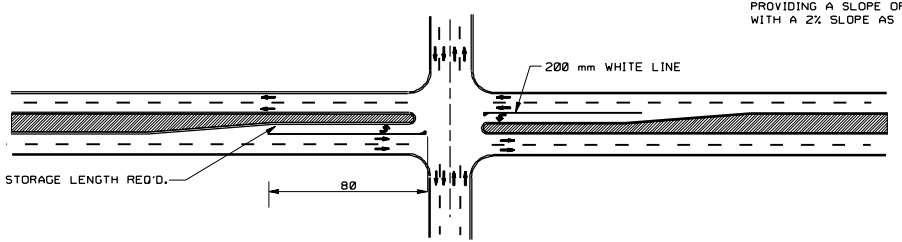
STD. DWG. NO.
815-1



TYPICAL SECTION MULTI LANE

TYPICAL CUT SLOPES

A. A FIXED WIDTH TO BE ESTABLISHED TO THE NEAREST 0.15 m TO REMAIN CONSTANT EVEN UNDER CONDITIONS OF SUPERELEVATION PROVIDING A SLOPE OF NOT LESS THAN 1:6 IN A NORMAL SECTION WITH A 2% SLOPE AS DETERMINED BY REQUIRED SURFACING THICKNESS.



TYPICAL MEDIAN LEFT TURN LANE

FOR MEDIANS GREATER THAN 8.5 m

	DESIGN SPEED (km/h)			
	80	100	110	120
MAXIMUM GRADE - FLAT TERRAIN	4	3	3	3
MAXIMUM GRADE - ROLLING TERRAIN	5	4	4	4
MAXIMUM GRADE - MOUNTAINOUS TERRAIN	7	6	5	5
MINIMUM CURVE RADIUS	250	435	560	755
STOPPING SIGHT DISTANCE *	112.8-139.4	157.0-205.0	179.5-246.4	202.9-285.6

* STOPPING SIGHT DISTANCES SHOULD BE MAXIMIZED WHERE POSSIBLE

GENERAL NOTES.

1. THE STANDARDS SHOWN ARE RECOMMENDED VALUES. DESIGN VALUES SHALL BE AS HIGH AS ARE COMMENSURATE WITH CONDITIONS.
2. CURVATURE AND SUPERELEVATION SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 805-1.
3. 2.4 m OUTSIDE SHOULDERS MAY BE USED FOR EMERGENCY PARKING IN CURB SECTIONS AND FOR AUXILIARY LANES.
4. NORMAL WHENEVER FEASIBLE, INDEPENDENT ROADWAY DESIGN SHALL BE UTILIZED WITH A VARIABLE WIDTH MEDIAN, WHEN INDEPENDENT ROADWAY IS NOT ADAPTABLE TO TERRAIN CONDITIONS, A UNIFORM WIDTH MEDIAN SHALL BE DESIGNED AS WIDE AS PRACTICAL WITH A MINIMUM WIDTH OF 20 m IN MOUNTAINOUS TERRAIN. A MINIMUM WIDTH OF 4.3 m MAY BE USED WITH MEDIAN BARRIER.
5. TYPICAL FILL SLOPES AND CUT SLOPES SHALL APPLY WITH WIDE MEDIAN & INDEPENDENT ROADWAY DESIGN.
6. DEPRESSED MEDIANS ARE DESIREABLE WHERE MEDIAN IS NOT OF SUFFICIENT WIDTH TO PROVIDE A DEPTH OF 0.3 m BELOW THE SUBGRADE SURFACE ON A 1:6 SLOPE. REDUCE SLOPE TO 1:10 OR LESS AND PAVE ENTIRE AREA.
7. SUFFICIENT LANES SHALL BE PROVIDED TO GIVE ADEQUATE CAPACITY FOR THE PROJECTED 20 YEARS DHV WHEN STAGE CONSTRUCTION IS PROPOSED FOR TWO LANES ONLY. INITIAL LANES SHALL BE CONSTRUCTED TO THE GEOMETRICS AND CROSS SLOPE REQUIRED FOR THE ULTIMATE DESIGN. THE TWO LANE CROWNED SECTION WILL BE DESIGNED IF ADDITIONAL LANES ARE NOT WARRANTED.
8. THE MINIMUM R/W CLEARANCE SHALL BE 6 m OUTSIDE THE TOE OF FILL SLOPES 9 m OUTSIDE THE TOP OF CUT SLOPE FOR THROUGH HIGHWAYS AND RAMP & 3 m FOR FRONTAGE ROADS.
9. SEE PLANS FOR DRAINAGE THROUGH CHANNELIZED INTERSECTION IN DEPRESSED MEDIAN AREA.
10. IN RUGGED TERRAIN STEEPER CUT AND FILL SLOPES WILL BE REQUIRED WHEN EXCESSIVE QUANTITIES WOULD RESULT WITH SPECIFIED SLOPES. SLOPES USED SHOULD BE STABLE AS DETERMINED BY GEOLOGICAL AND SOIL INVESTIGATION. SLOPES ARE ALSO SUBJECT TO VARIATION AS MAY BE RECOMMENDED WHERE EXISTING RIGHT OF WAY IS RESTRICTIVE AND COSTS FOR PROVIDING ADDITIONAL RIGHT OF WAY WOULD BE EXCESSIVE. WHERE A DESIGN EXCEPTION TO THE DITCH WIDTHS SHOWN IS TO BE CONSIDERED FOR ROCK CUTS OVER 3 m, ROCKFALL CATCHMENT ANALYSIS WILL BE REQUIRED (SUCH AS RICHIE- 1963), WITH DITCH WIDTHS CONFORMING ACCORDINGLY.
11. TRANSITIONS FROM FLAT TO STEEPER CUT AND FILL SLOPES SHALL BE MADE IN SUFFICIENT DISTANCE SO AS TO PROVIDE A NATURAL PLEASING APPEARANCE.
12. TYPICAL DETAILS FOR SECTION ON CURVE, SECTION ON TANGENT, CUT DITCH FLARING, AND BENCHED SLOPE SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 815-1.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	09/29/99	B.A.	MAXIMUM CHANGED TO MINIMUM IN LINE 4 OF TABLE
2	01/08/01	J.K.	REVISED CUT DETAIL-REVISED NOTE 10 AND ADDED NOTES 11 AND 12.
3	03/29/01	J.K.	REVISED SLOPING NOTES.
4	04/18/01	FRW	REMOVED NOTE TO THE LEFT OF "TYPICAL SECTION MULTILANE"

REVISIONS

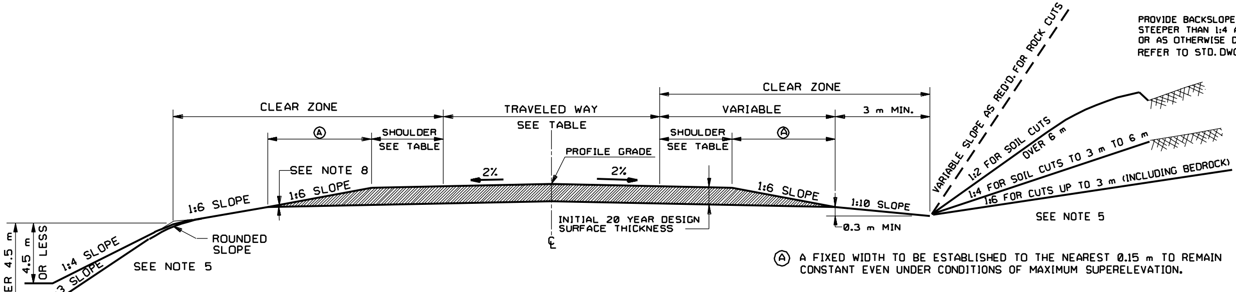
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.10.2001 DATE
DEPUTY DIRECTOR

(METRIC)

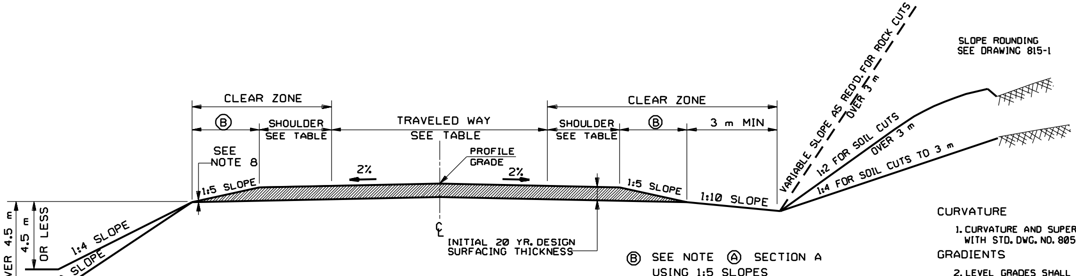
STANDARD DRAWING TITLE
DESIGN STANDARDS FOR RURAL MULTI LANE HIGHWAYS OTHER THAN FREEWAYS

STD. DWG. NO.
815-2



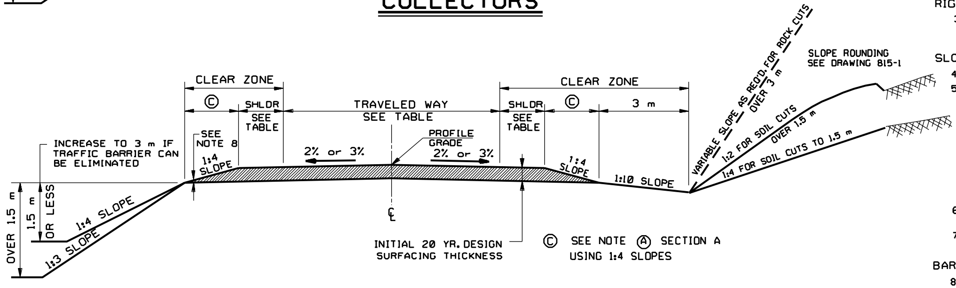
Ⓐ A FIXED WIDTH TO BE ESTABLISHED TO THE NEAREST 0.15 m TO REMAIN CONSTANT EVEN UNDER CONDITIONS OF MAXIMUM SUPERELEVATION.

ARTERIALS



Ⓑ SEE NOTE Ⓐ SECTION A USING 1:5 SLOPES

COLLECTORS



Ⓒ SEE NOTE Ⓐ SECTION A USING 1:4 SLOPES

LOCAL ROADS

CURVATURE

1. CURVATURE AND SUPERELEVATIONS SHOULD BE IN ACCORDANCE WITH STD. DWG. NO. 805-1.

GRADIENTS

2. LEVEL GRADES SHALL BE PERMITTED ON FILL SECTIONS BUT A MINIMUM 0.3% GRADE SHALL BE MAINTAINED THROUGHOUT CUT OR CURBED SECTIONS.

RIGHT OF WAY

3. THE MINIMUM R/W CLEARANCE SHALL BE 6m OUTSIDE THE TOE OF FILL SLOPES, 9m OUTSIDE THE TOP OF CUT SLOPES FOR THROUGH HIGHWAYS AND RAMPS AND 3m FOR FRONTAGE ROADS.

SLOPES

4. USE OF CONSTANT DISTANCE CUT AND FILL SLOPE IS RECOMMENDED.
5. IN RUGGED TERRAIN STEEPER CUT AND FILL SLOPES WILL BE REQUIRED WHEN EXCESSIVE QUANTITIES WOULD RESULT WITH SPECIFIED SLOPES. SLOPES USED SHOULD BE STABLE AS DETERMINED BY GEOLOGICAL AND SOIL INVESTIGATION. SLOPES ARE ALSO SUBJECT TO VARIATION AS MAY BE RECOMMENDED WHERE EXISTING RIGHT OF WAY IS RESTRICTIVE AND COSTS FOR PROVIDING ADDITIONAL RIGHT OF WAY WOULD BE EXCESSIVE. WHERE A DESIGN EXCEPTION TO THE DITCH WIDTHS SHOWN IS TO BE CONSIDERED FOR ROCK CUTS OVER 3 m, ROCKFALL CATCHMENT ANALYSIS WILL BE REQUIRED (SUCH AS RICHIE- 1963), WITH DITCH WIDTHS CONFORMING ACCORDINGLY.
6. TRANSITIONS FROM FLAT TO STEEPER CUT AND FILL SLOPES SHALL BE MADE IN SUFFICIENT DISTANCE SO AS TO PROVIDE A NATURAL PLEASING APPEARANCE.
7. TYPICAL DETAILS FOR SECTION ON CURVE, SECTION ON TANGENT, CUT DITCH FLARING, AND BENCHED SLOPE SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 815-1.

BARRIER GRADING

8. ON BRIDGE APPROACH, GRADE OUTSIDE EMBANKMENT AND MEDIAN TO CONFORM TO THE TRAFFIC BARRIER DESIGN.
9. INSTALL TRAFFIC BARRIER IN ACCORDANCE WITH AASHTO 'ROADSIDE DESIGN GUIDE'
10. BEGIN OVERLAYS ON THE PAVEMENT SIDE SLOPE WHERE A 25mm MINIMUM THICKNESS CAN BE OBTAINED.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	12/01/98	J.B.	REVISED SLOPES, AND CHANGED SHEET NUMBER.
2	04/14/99	B.A.	CORRECT ARROW DIRECTION IN ARTERIALS DETAIL.
3	01/08/01	J.H.	REVISED NOTE 5, REVISED CUT DETAILS, ADDED NOTE 7 AND RENUMBERED 8-9 AND 10.
4	03/29/01	J.H.	REVISED SLOPING NOTES.
5	04/10/01	FRW	CHANGED NOTE REFERENCE TO NOTE 9 UNDER "ARTERIALS" PUT SURFACE DITCH AT TOP OF CUT AND REVISED NOTE 9.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10,2001 DATE
APPROVED CHAIRMAN STANDARDS COMMITTEE
DEPUTY DIRECTOR — APR.10,2001 DATE

(METRIC)
STANDARDS FOR RURAL TWO LANE HIGHWAYS
STANDARD DRAWING TITLE

STD. DWG. NO.
815-3A

DESIGN STANDARDS
FOR
RURAL TWO (2) LANE ROADWAYS

GEOMETRIC DESIGN STANDARDS

	DESIGN SPEED (km/h)						
	30	50	60	80	100	110	120
STOPPING SIGHT DISTANCE (m)	29.6	57.4-62.8	74.3-84.6	112.8-139.4	157.0-205.0	179.5-246.4	202.9-285.6
PASSING SIGHT DISTANCE (m)	217	345	407	541	670	728	792
MINIMUM CURVE RADIUS (m) (E = 0.06 SUPERELEVATION)	30	90	135	250	435	560	755
PRINCIPAL ARTERIAL MAXIMUM GRADE (PERCENT)							
LEVEL	N/A	N/A	5	4	3	3	3
ROLLING	N/A	N/A	6	5	4	4	4
MOUTAINOUS	N/A	N/A	8	7	6	5	5
MINOR ARTERIAL MAXIMUM GRADE (PERCENT)							
LEVEL	N/A	N/A	5	4	3	3	3
ROLLING	N/A	N/A	6	5	4	4	4
MOUTAINOUS	N/A	N/A	8	7	6	5	5
COLLECTOR MAXIMUM GRADE (PERCENT)							
LEVEL	7	7	7	6	5	4	N/A
ROLLING	10	9	8	7	6	5	N/A
MOUTAINOUS	12	10	10	9	8	6	N/A
LOCAL MAXIMUM GRADE (PERCENT)							
LEVEL	8	7	7	6	5	N/A	N/A
ROLLING	11	10	10	8	6	N/A	N/A
MOUTAINOUS	16	14	13	10	N/A	N/A	N/A

COLLECTORS

DESIGN CONTROL	A.D.T. UNDER 400	A.D.T. 400 TO 1500	A.D.T. 1500 TO 2000	A.D.T. OVER 2000
DESIGN SPEED (km/h)				
LEVEL	60	80	80	100
ROLLING	50	60	60	80
MOUTAINOUS	30	50	50	60
TRAVELED WAY (m)				
LEVEL	6.0	6.6	6.6	7.2
ROLLING	6.0	6.6	6.6	7.2
MOUTAINOUS	6.0	6.6	6.6	7.2
SHOULDER	0.6	1.5 *	1.8 *	2.4 *
SURFACE TYPE		ROAD MIX ASPHALT SURFACE COURSE OR ASPHALT CONCRETE PAVEMENT		

NOTES:

CLEAR ZONE - USE AASHTO "ROADSIDE DESIGN GUIDE" TO DETERMINE APPROPRIATE MINIMUM CLEAR ZONE.

* OPTIONAL APPLICATION ; 1.2 m MINIMUM PAVED SHOULDER WITH THE REMAINING WIDTH AS UNTREATED BASE COURSE.

LOCAL ROADS

DESIGN CONTROL	A.D.T. UNDER 400	A.D.T. 400 TO 1500	A.D.T. 1500 TO 2000	A.D.T. OVER 2000
DESIGN SPEED (km/h)				
LEVEL	60	80	80	80
ROLLING	50	60	60	60
MOUTAINOUS	30	50	50	50
TRAVELED WAY (m)				
LEVEL	5.4	6.6	6.6	7.2
ROLLING	5.4	6.0	6.6	7.2
MOUTAINOUS	5.4	6.0 **	6.6	7.2
SHOULDER	0.6	1.5 **	1.8	2.4
SURFACE TYPE	ROAD MIX ASPHALT SURFACE COURSE OR ASPHALT CONCRETE PAVEMENT			

** MOUNTAINOUS TERRAIN A.D.T.-400-600 5.4 m WIDTH AND 0.6 m SHOULDER

PRINCIPAL ARTERIALS

DESIGN CONTROL	A.D.T. UNDER 400	A.D.T. 400 TO 1500	A.D.T. 1500 TO 2000	D.H.V. OVER 200
DESIGN SPEED (km/h)				
LEVEL	110	110	110	110
ROLLING	100	100	100	100
MOUTAINOUS	80	80	80	80
TRAVELED WAY (m)				
LEVEL	7.2	7.2	7.2	7.2
ROLLING	7.2	7.2	7.2	7.2
MOUTAINOUS	6.6	6.6	6.6	7.2
SHOULDER	1.2	1.8 *	1.8*	2.4*
SURFACE TYPE	ASPHALT CONCRETE PAVEMENT			

MINOR ARTERIALS

DESIGN CONTROL	A.D.T. UNDER 400	A.D.T. 400 TO 1500	A.D.T. 1500 TO 2000	D.H.V. OVER 2000
DESIGN SPEED (km/h)				
LEVEL	100	100	100	100
ROLLING	80	80	80	80
MOUTAINOUS	60	60	60	60
TRAVELED WAY (m)				
LEVEL	7.2	7.2	7.2	7.2
ROLLING	6.6	6.6	6.6	7.2
MOUTAINOUS	6.6	6.6	6.6	7.2
SHOULDER	1.2	1.8 *	1.8 *	2.4 *
SURFACE TYPE	ASPHALT CONCRETE PAVEMENT			

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS
1	12/07/98	S.A.	REVISED BOXES, AND CHANGED SHEET NUMBER.
2	04/14/99	B.A.	CORRECT TABLE READINGS IN PRINCIPAL ARTERIALS AND MINOR ARTERIALS.
3	10/26/99	F.R.W.	REMOVED ASTRICK NOTE REFERING TO L2 m PAVED. AND CORRECTED TABLE FOR COLLECTORS.
4	02/22/01	F.R.W.	ADDED ASTRICK NOTE AND ADDED ASTRICK TO COLLECTORS, PRINCIPAL AND MINOR ARTERIALS.
5	04/10/01	F.R.W.	CORRECTED DOUBLE ASTRICK NOTE, CORRECTED ALL TABLES. MATCH AASHTO WORDING.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE — APR.10.2001 DATE

APPROVED

DEPUTY DIRECTOR — APR.10.2001 DATE

(METRIC)

STANDARD DRAWING TITLE

STANDARDS FOR RURAL TWO LANE HIGHWAYS

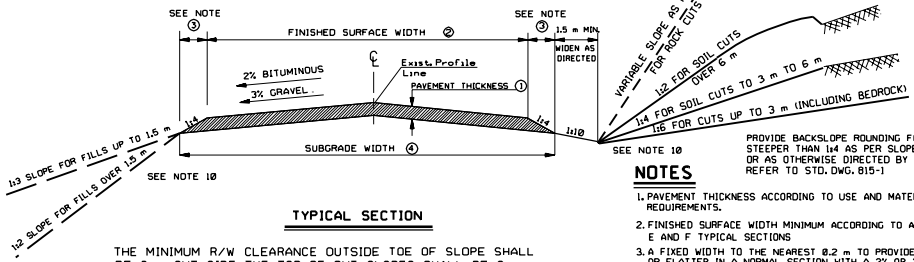
STD. DWG. NO.

815-3B

CURRENT ADT
(TO BE USED WHEN NORMAL TRAFFIC COUNTS ARE UNAVAILABLE)

	ADT EACH HECTARE	MINIMUM ADT EACH PARCEL	MAXIMUM ADT EACH PARCEL
RESIDENCE		10	10
IRRIGATION FARM LAND			
ROW CROPS	0.020	1.0	8.0
IMPROROVED PASTURE	0.004	1.0	2.0
GRANS AND HAY	0.008	2.0	6.0
TRUCK FARM	0.081	4.0	10.0
DRY FARM LAND	0.001	2.0	3.0
GRAZING LAND			
SEMI-IRRIGATION GRAZING	0.002	0.5	2.0
SEMI-IRRIGATION GRAZING	0.002	1.0	1.0

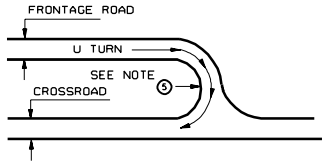
LAND USE	CURRENT ADT	TYPICAL SECTION
RELOCATED CITY STREETS		
DEVELOPED AREAS	UNDER 50	F
UNDEVELOPED AREAS	UNDER 50	E
RELOCATED COUNTY ROADS		
	10 - 50	E
	UNDER 10	D
PROPERTY ACCESS ROADS		
RESIDENTIAL COMMERCIAL OR INDUSTRIAL AREA		
DEVELOPED AREAS	UNDER 50	F
UNDEVELOPED AREAS	10 - 50	E
UNDEVELOPED AREAS	UNDER 10	D
FARM , PASTURE AND RANGE LAND		
	20 - 50	E
	10 - 20	D
	5 - 20	C
	2 - 5	B
	UNDER 2	A



TYPICAL SECTION

THE MINIMUM R/W CLEARANCE OUTSIDE TOE OF SLOPE SHALL BE 6 m OUT SIDE THE TOP OF CUT SLOPES SHALL BE 9 m FOR THOUGH HIGHWAYS AND RAMPS AND 3.0 m FOR FRONTAGE ROADS.

PROVIDE BACKSLOPE ROUNDING FOR ALL CUTS STEEPER THAN 1:4 AS PER SLOPE ROUNDING DETAIL, OR AS OTHERWISE DIRECTED BY THE ENGINEER. REFER TO STD. DWG. 815-1



INTERSECTION OF FRONTAGE ROAD AND CROSSROAD

NOTES

1. PAVEMENT THICKNESS ACCORDING TO USE AND MATERIALS REQUIREMENTS.
2. FINISHED SURFACE WIDTH MINIMUM ACCORDING TO A,B,C,D E AND F TYPICAL SECTIONS
3. A FIXED WIDTH TO THE NEAREST 0.2 m TO PROVIDE 1:4 SLOPE OR FLATTER IN A NORMAL SECTION WITH A 2% OR 3% SLOPE REMAINING CONSTANT EVEN THOUGH CONDITIONS OF SUPER ELEVATIONS.
4. SUBGRADE WIDTH AS REQUIRED TO ACCOMMODATE 1:4 SLOPE FOR NOTE NO. 3 AND SURFACING WIDTH NOTE NO. 2 MINIMUM WIDTH IN ANY CASE ACCORDING TO A,B,C,D,E AND F TYPICAL SECTIONS.
5. FRONTAGE ROAD CONNECTION SHALL BE DESIGNED WITH A MINIMUM TURNING RADIOUS OF 18 m AT INTERSECTIONS EXCEPT THAT A TURNING RADIOUS OF 15 m MAY BE USED WHERE FRONTAGE ROAD VOLUMES ARE UNDER 50 ADT, AND NO REGULAR LARGE VEHICLE MOVEMENTS ARE EXPECTED.
6. THE MINIMUM R/W CLEARANCE SHALL BE 6 m OUTSIDE THE TOE OF FILL SLOPE 9 m OUTSIDE THE TOP OF CUT SLOPE FOR THROUGH HIGHWAYS AND RAMPS & 3 m FOR FRONTAGE ROADS.
7. DESIGN STANDARDS AS SPECIFIED IN STANDARDS DRAWING 815-3 SHALL APPLY FOR ALL FRONTAGE ROADS OVER 50 ADT.
8. TYPICAL SECTIONS A THROUGH F BASED ON C.B.R. VALUE OF 10% OR GREATER.
9. THE ENGINEER SHALL DETERMINE THE SUITABILITY OF GRANULAR MATERIAL AVAILABLE ON PROJECT.
10. IN RUGGED TERRAIN STEEPER CUT AND FILL SLOPES WILL BE REQUIRED WHEN EXCESSIVE QUANTITIES WOULD RESULT WITH SPECIFIED SLOPES. SLOPES USED SHOULD BE STABLE AS DETERMINED BY GEOLOGICAL AND SOIL INVESTIGATION. SLOPES ARE ALSO SUBJECT TO VARIATION AS MAY BE RECOMMENDED WHERE EXISTING RIGHT OF WAY IS RESTRICTIVE AND COSTS FOR PROVIDING ADDITIONAL RIGHT OF WAY WOULD BE EXCESSIVE. WHERE A DESIGN EXCEPTION TO THE DITCH WIDTHS SHOWN IS TO BE CONSIDERED FOR ROCK CUTS OVER 3 m, ROCKFALL CATCHMENT ANALYSIS WILL BE REQUIRED (SUCH AS RICHIE- 1963), WITH DITCH WIDTHS CONFORMING ACCORDINGLY.
11. TRANSITIONS FROM FLAT TO STEEPER CUT AND FILL SLOPES SHALL BE MADE IN SUFFICIENT DISTANCE SO AS TO PROVIDE A NATURAL PLEASING APPEARANCE.
12. TYPICAL DETAILS FOR SECTION ON CURVE, SECTION ON TANGENT, CUT DITCH FLARING AND BENCHED SLOPE SHALL BE IN ACCORDANCE WITH STANDARD DRAWING 815-1.

TYPICAL SECTION STANDARDS

TYPICAL SECTION	FINISHED SURFACE WIDTH (m)	MINIMUM SUBGRADE WIDTH (m)	APPROXIAE SURFACE THICKNESS(mm)	SURFACE TYPE
A	4.3	5.5	150	GRANULAR MATERIAL
B	4.3	5.5	150	UNTREATED BASE
C	5.5	6.7	150	UNTREATED BASE
D	6.7	7.9	150	UNTREATED BASE
E	7.9	9.1	150	UNTREATED BASE DEEP PENETRATING ASPHALT
F	7.9		75 225	ASPHALT SURFACING UNTREATED BASE

	DESIGN SPEED (km/h)			
	15	30	50	60
MAXIMUM GRADE - FLAT TERRAIN	8%	8%	7%	7%
MAXIMUM GRADE - ROLLING TERRAIN	12%	11%	10%	9%
MAXIMUM GRADE - MOUNTAINOUS TERRAIN	18%	16%	14%	12%
STOPING SIGHT DISTANCE (m)	15	30	70	90
MINIMUM PASSING SIGHT DISTANCE (m)	250	250	340	460
MINIMUM RADIUS FOR 6% SUPER (m)	12	55	90	135

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR	REMARKS
1	11/28/98		REVISED SLOPES.
2	10/08/01	JJK	REVISED CUT DETAIL AND ADDED NOTES 10 & 11 AND 12.
3	02/29/01	JJK	REVISED SLOPING NOTES.
4	04/10/01	FRH	TABLE "CURRENT ADT" CHANGE LAST COLUMN TO READ MAXIMUM AND ADDED SURFACE DITCH TO TOP OF CUT.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

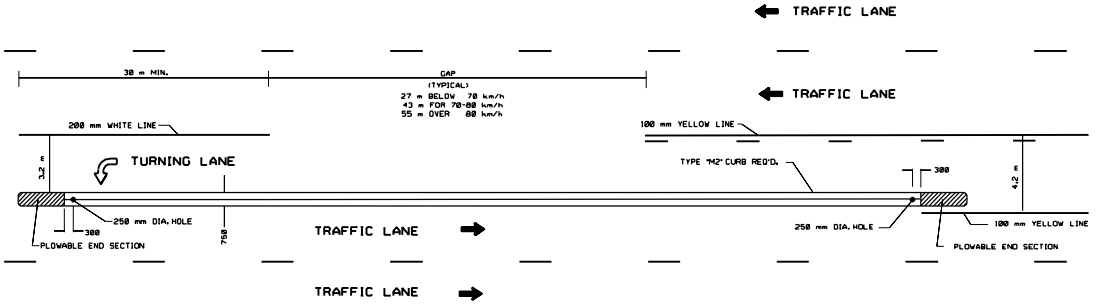
RECOMMENDED FOR APPROVAL — APR.10.2001 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR.10.2001 DATE
DEPUTY DIRECTOR

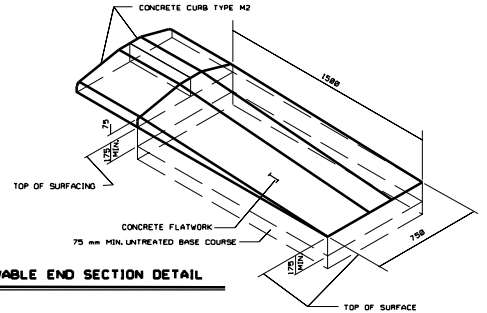
(METRIC)

STANDARD DRAWING TITLE
FRONTAGE AND ACCESS ROAD STANDARDS FOR LOW VOLUME ROADS (UNDER 50 ADT)

STD. DWG. NO.
815-4

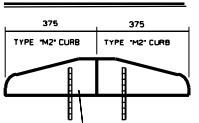
MEDIAN WITH RAISED ISLAND





PLOWABLE END SECTION DETAIL

RAISED ISLAND DETAIL



NOTES:

1. DESIGN TO SHOW CONTROL POINTS - STATION & OFFSET.
2. ALL ISLANDS SHALL BE PAINTED IN ACCORDANCE WITH PART III OF THE MUTCD

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO	DATE	APPR.	REVISIONS REMARKS
1	8/28/96		COMPLETELY REDESIGNED RAISED MEDIAN
2	04/27/99	S.A.	FIX ANNOTATION IN NOTE 2

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR. 27, 1999 — DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — APR. 27, 1999 — DATE
DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE

RAISED MEDIAN

STD. DWG. NO.

815-5

DESIGN STANDARDS ARTERIALS URBAN

DESIGN SPEED (km/h)		60	80	100
STOPPING SIGHT DISTANCE (m) ③	DESIRABLE	85	139	205
	MINIMUM	74	113	157
PASSING SIGHT DISTANCE (m)		425	550	665
MAXIMUM GRADIENT (PERCENT %)		8	7	6
MINIMUM CURVE RADIUS (m)	4% SUPER	150	280	490
	6% SUPER	135	250	435
WIDTH OF LANES (m)	DESIRABLE	3.6	3.6	3.6
	MINIMUM	3.3	3.3	3.6
MINIMUM WIDTH OF SHOULDERS OR PARKING (m)		3.0	3.0	3.0
WIDTH OF AUXILIARY LANES (m)	DESIRABLE	3.6	3.6	3.6
	MINIMUM	3.0 W/ 0-9% TRUCKS 3.3 W/ 10-14% TRUCKS 3.6 W/ 15% OR MORE TRUCKS		
WIDTH OF MEDIAN (m)	WITH TURN LANE	4.3 DESIRABLE 3.6 MINIMUM		
	NO TURN LANE	1.2 MINIMUM		

DESIGN STANDARDS COLLECTOR URBAN

		A.D.T. 0 TO 400	A.D.T. 400 ADT TO 100 DHV	D.H.V. 100 TO 200	D.H.V. 200 TO 400	D.H.V. OVER 400
DESIGN SPEED (km/h)		50	60	60	80	80
STOPPING SIGHT DISTANCE (m) ③	DESIRABLE	63	85	85	139	139
	MINIMUM	57	74	74	113	113
PASSING SIGHT DISTANCE (m)		350	425	425	550	550
MAXIMUM GRADIENT (PERCENT %)		11	10	10	8	8
MINIMUM CURVE RADIUS (m) ①		90	175	175	290	290
WIDTH OF LANES (m)	DESIRABLE	3.6				
	MINIMUM	3.3				
WIDTH OF SHOULDER (m)	PARKING	2 - 3.3 RESIDENTIAL				
	NO PARKING	0.6	1.2	1.8	2.4	2.4
WIDTH OF AUXILIARY LANES (m)	DESIRABLE	3.6	3.6	3.6	3.6	3.6
	MINIMUM	3.0 W/ 0-9% TRUCK 3.3 W/ 10-14% TRUCKS 3.6 W/ 15% OR MORE TRUCKS				
WIDTH OF MEDIAN (m)	WITH TURN LANE	4.3 DESIRABLE 3.6 MINIMUM				
	NO TURN LANE	0.6 MINIMUM				

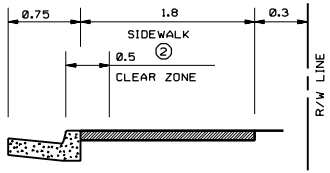
DESIGN STANDARDS LOCALS URBAN

		RESIDENTIAL			COMMERCIAL INDUSTRIAL		
DESIGN SPEED (km/h)		30	40	50	30	40	50
STOPPING SIGHT DISTANCE (m) ③	DESIRABLE	30	44	63	30	44	63
	MINIMUM	30	44	57	30	44	57
MAXIMUM GRADIENT (PERCENT %)		15% MAXIMUM 4% OR LESS DESIRABLE			5% OR LESS DESIRABLE 8% MAXIMUM		
MINIMUM RADIUS (m)		30	50	75	30	50	75
SUPERELEVATION		NEED NOT BE PROVIDED			SHOULD BE PROVIDED IN INDUSTRIAL AREAS		
WIDTH OF LANES (m)	DESIRABLE	3.3			3.6		
	MINIMUM	3.0			3.3		
MINIMUM WIDTH OF PARKING (m)		2.4			3.0		
MINIMUM WIDTH OF ROADWAY (m) (TRAVELED WAY PLUS SHOULDERS)		7.9 10.4 WITH PARKING			7.9 10.7 WITH PARKING		

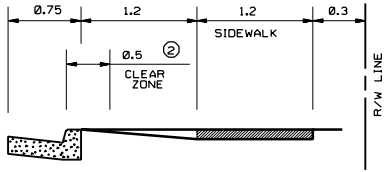
① SUPERELEVATION IS NOT REQUIRED, BUT A MAXIMUM OF 4% IS ALLOWED.

② CLEAR ZONE FOR NON CURB SECTIONS, RURAL CONDITIONS APPLY.

③ VALUE APPROACHING OR EXCEEDING THE UPPER LIMITS OF THE RANGE SHOULD BE USED AS THE BASIS FOR DESIGN WHEREVER CONDITIONS PERMIT.



MINIMUM BORDER AREA



DESIRABLE BORDER AREA

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	12/09/97		UPDATED FROM DI TEAM
2	05/08/98	S.A.	REMOVE NOTE REFERENCE FOR NOTE PREVIOUSLY DELETED.
3	12/01/98	S.A.	REVISED BOXES, ADDED NOTE # 3
4	10/25/00	FRW	CORRECTED SPELLING IN NOTE 3.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — DEC.12,2000 DATE

CHAIRMAN, STANDARDS COMMITTEE APPROVED — DEC.12,2000 DATE

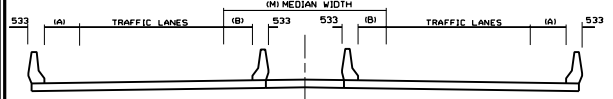
DEPUTY DIRECTOR

(METRIC)

STANDARDS FOR URBAN ROADWAYS

STANDARD DRAWING TITLE

STD. DWG. NO.
815-6

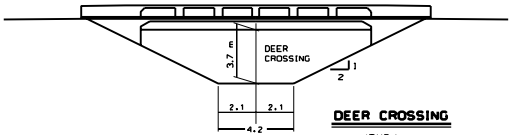


STRUCTURE CROSS SECTION

(A) OR (B) NORMAL SHOULDER PLUS 0.6 m FOR ALL ROADS AND RAMPS.

(M) WHEN MEDIAN WIDTH IS LESS THAN 9 m USE CLOSED STRUCTURE WHICH INCLUDES FULL MEDIAN WIDTH.

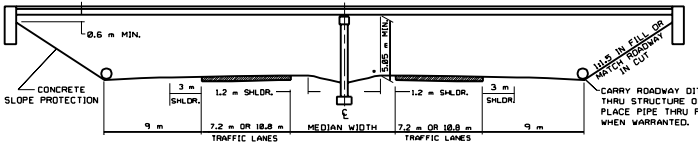
(W) FOR TWO WAY SINGLE STRUCTURE MATCH ROADWAY WIDTH PLUS 0.6 m GUARDRAIL OFFSET EACH SIDE.



DEER CROSSING

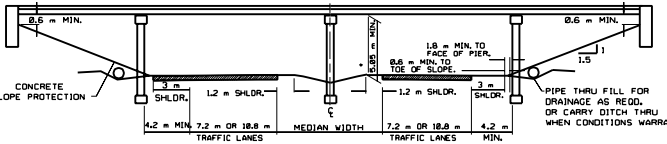
(TYP.)

NON VEHICULAR



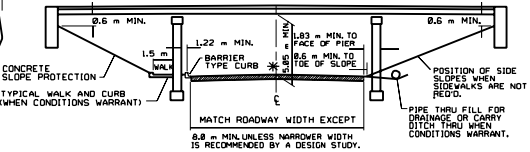
PREFERRED UNDERPASS CLEARANCE

(FREEWAY)



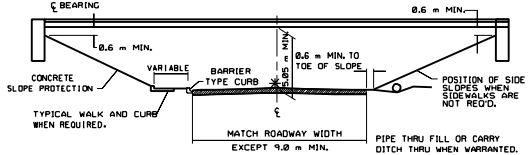
MINIMUM UNDERPASS CLEARANCE

(FREEWAY)



MINIMUM UNDERPASS CLEARANCE

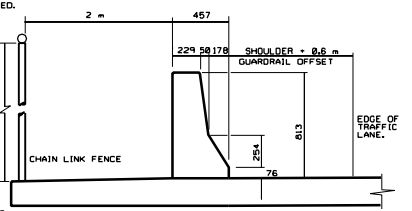
(OTHER THAN FREEWAY)



PREFERRED UNDERPASS CLEARANCE

(OTHER THAN FREEWAY)

* A RANGE OF 0.15 m WILL BE ALLOWED ABOVE THE MIN. CLEARANCE SHOWN EXCEPT WHEN OTHER GEOMETRIC CONSIDERATIONS GOVERN.



SIDEWALK GEOMETRIC

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	REVISIONS	REMARKS
1	12/31/98	S.A.	REVISED SLOPE
2	04/14/99	B.A.	REALIGN NOTE REFERENCE IN UPPER LEFT DETAIL AND CORRECT SPELLING ERROR IN UPPER RIGHT DETAIL

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

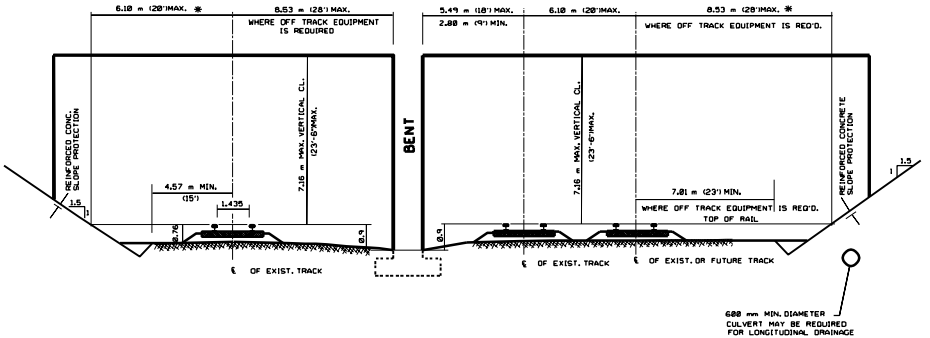
RECOMMENDED FOR APPROVAL — APR.14,1999 — DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED
DEPUTY DIRECTOR — APR.14,1999 — DATE

(METRIC)

STRUCTURE GEOMETRIC DESIGN STANDARDS

STANDARD DRAWING TITLE

STD. DWG. NO.
B15-7



(1) THE TOE OF THE SLOPES SHALL BE CONTROLLED BY THE DIMENSIONS SHOWN.

(2) HORIZONTAL CLEARANCES SHOWN ARE NORMAL TO THE CENTERLINE OF THE TRACK. REDUCED CLEARANCES MAY BE USED WHEN REQUIRED BY SPECIAL CONDITIONS AND WITH APPROVAL OF THE RAILROAD INVOLVED.

(3) THE SIZE OF THE CUT DITCH WILL BE DETERMINED BY A HYDRAULIC ANALYSIS.

(4) * THIS DISTANCE MAY BE INCREASED AT INDIVIDUAL STRUCTURE LOCATIONS AS APPROPRIATE TO PROVIDE FOR UNUSUAL DRAINAGE, OR SNOW STORAGE.

(a) IF JUSTIFIED BY HYDRAULIC ANALYSIS THE CUT DITCH MAY BE PIPED OR THE DISTANCE MAY BE INCREASED TO ACCOMMODATE A LARGER CHANNEL.

(b) IF JUSTIFIED BY THE RAILROAD THIS DISTANCE MAY BE INCREASED TO PROVIDE SPACE FOR HEAVY OR DRIFTING SNOW.

ALL DIMENSIONS ARE SHOWN IN METERS (m) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS
1	10/13/98		UPDATED TO MEET FHWA AND RAILROAD REQUIREMENTS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JANUARY 1998 DATE

COURTESY STANDARDS COMMITTEE APPROVED — JANUARY 1998 DATE

DEPUTY DIRECTOR

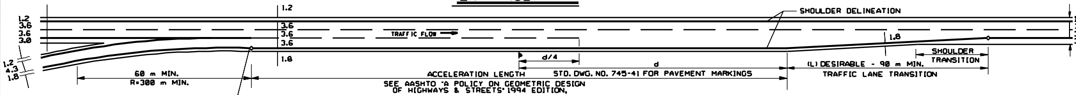
(METRIC)

RAILROAD CLEARANCES AT HIGHWAY OVERPASS STRUCTURES

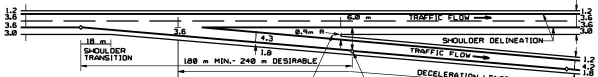
STANDARD DRAWING TITLE

STD. DWG. NO.
B15-8

ENTRANCE RAMP

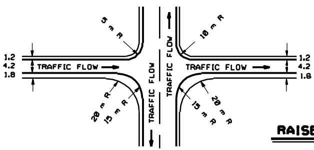


EXIT RAMP



NOTES:

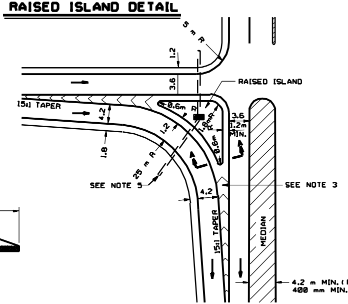
1. GEOMETRIC CONTROL POINTS SHALL BE FURNISHED WITH PROJECT PLANS.
2. TURNING RADIUS FOR LEFT TURNS DESIGN WB=15 m
3. PAINTING DETAIL SHALL BE FURNISHED WITH PROJECT PLANS IN ACCORDANCE WITH CURRENT STANDARDS.
4. CURVE WIDENING IN ACCORDANCE WITH STD. DWG. NO. 805-1.
5. PROVIDE DRAINAGE FROM CATCH BASIN IN RAISED ISLAND AREA.
6. PROVIDE PAVEMENT STOPPING SIGHT DISTANCE ON CROSS ROADS.



TYPE "B"

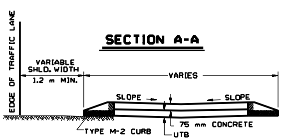
NOTE: TYPE "B" TO BE USED IN AREAS WITH LESS THAN 100 D.H.V.

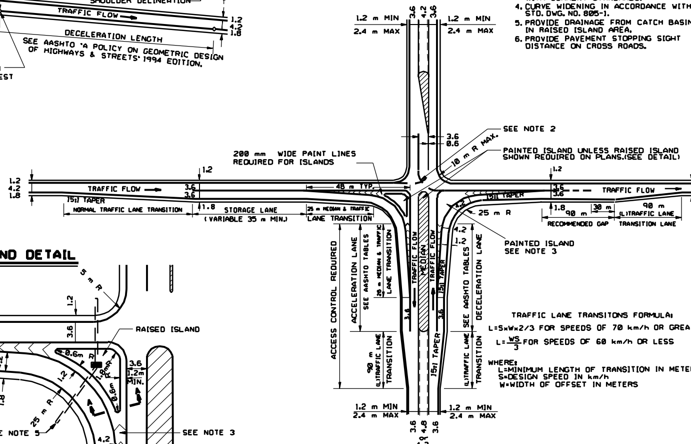
RAISED ISLAND DETAIL



4.2 m MIN. (PAINTED ISLAND - STD.DWG.NO. 745-45)
400 mm MIN. (RAISED ISLAND - STD.DWG.NO. 815-5)

SECTION A-A





TYPE "A"

TRAFFIC LANE TRANSITONS FORMULA:

$L = S \times W \times 2/3$ FOR SPEEDS OF 70 km/h OR GREATER

$L = \frac{WS}{3}$ FOR SPEEDS OF 60 km/h OR LESS

WHERE:
L=MINIMUM LENGTH OF TRANSITION IN METERS
S=DESIGN SPEED IN km/h
W=WIDTH OF OFFSET IN METERS

ALL DIMENSIONS SHOWN ARE METERS (m) UNLESS OTHERWISE NOTED.

	REVISIONS	
1	12/09/97	UPDATED FROM QI TEAM
2	05/12/98	CORRECTED ERROR IN DIMENSION FOR RAMP WIDTH, IN TWO PLACES.
3	07/14/98	CORRECT MISSPRINT IN "ALL DIMENSIONS " NOTE.

REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JULY 14,1998 — DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED

DEPUTY DIRECTOR — JULY 14,1998 — DATE

(METRIC)

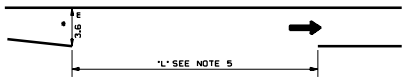
ENTRANCE & EXIT RAMP GEOMETRICS

STANDARD DRAWING TITLE

STD. DWG. NO.

825-1

DETAIL -"A"



* 3.6 m LANE WIDTH DESIRABLE
3.0 m MIN. LOW VOLUME LOW SPEED

NOTES:

1. FOR A LEG INTERSECTION, PROVIDE LEFT TURN POCKET ON OPPOSITE APPROACH. ALSO ADD RIGHT TURN DECELERATION LANE IF WARRANTED.
2. PROVIDE RIGHT TURN DECELERATION LANE WHEN DHV ON MAIN HIGHWAY EXCEEDS 300 & CROSSROAD ADT EXCEEDS 100. INCREASE THE VOLUMES (DHV & ADT) TO PROVIDE PASSENGER CAR EQUIVALENT FOR TRUCKS.
3. PROVIDE LEFT TURN LANE AT ALL INTERSECTING CROSSROADS WHEN VOLUMES EXCEED THOSE LISTED IN TABLE I ((INCREASE THE VOLUMES (DHV & ADT) TO PROVIDE PASSENGER CAR EQUIVALENT FOR TRUCKS.)
4. FOR SPEEDS 70 km/h OR OVER
   $L = S \times W \times 2/3$
   FOR SPEEDS 60 Km/h OR LESS
   $L = \frac{WS}{3}$
   L : LENGTH IN METER
   S : 85th PERCENTILE SPEED km/h
   W : OFFSET IN METERS
5. L= 55 m FOR SPEEDS OVER 70 km/h
   L= 40 m FOR SPEEDS 70 km/h OR LESS

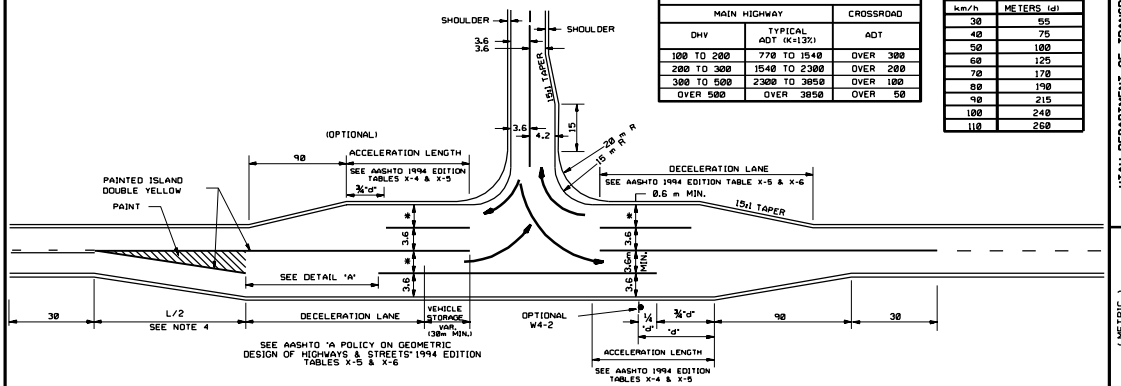
RURAL

TABLE I

MAIN HIGHWAY		CROSSROAD
DHV	TYPICAL ADT (K=13%)	ADT
100 TO 200	770 TO 1540	OVER 300
200 TO 300	1540 TO 2300	OVER 200
300 TO 500	2300 TO 3850	OVER 100
OVER 500	OVER 3850	OVER 50

"d" DISTANCE

km/h	METERS (d)
30	55
40	75
50	100
60	125
70	170
80	190
90	215
100	240
110	260



ALL DIMENSIONS SHOWN ARE METERS (m) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REVISIONS
1	8/23/96		UPDATED FROM BLUE BOOK
2	05/23/96		CORRECT TABLES AND DRAWINGS, NEW DETAIL A.
3	12/18/98	B.A.	TABLE I CHANGED AND TO CORRECT DIMENSION
4	03/25/99	B.A.	IN UPPER RIGHT ACCELERATION LENGHT DETAIL CORRECT SKIP LINE DIMENSION

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — DATE APRIL 14, 1999
APPROVED
DEPUTY DIRECTOR — DATE APRIL 14, 1999

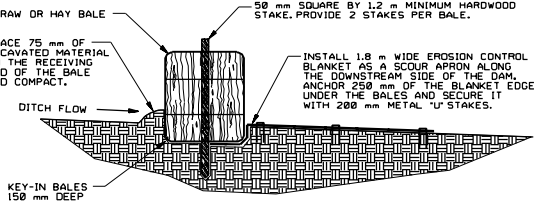
(METRIC)

TYPICAL RURAL 2 LANE ROAD WITH MEDIAN LANE AND DECELERATION LANE FOR INTERSECTING CROSSROADS

STANDARD DRAWING TITLE

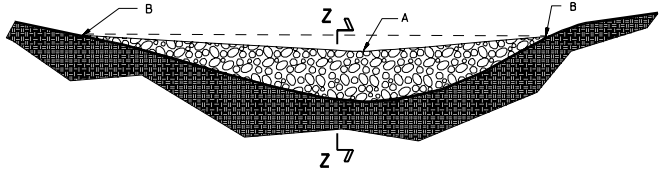
STD. DWG. NO.
825-2

CHECK DAMS

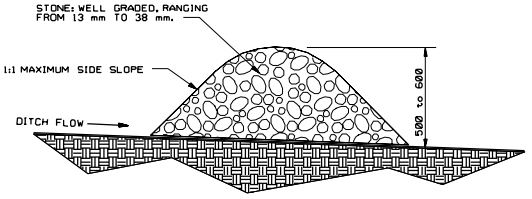


SECTION Y - Y

CONSTRUCT THE CHECK DAM SO THAT POINT "A" IS APPROXIMATELY 100 mm LOWER THAN POINT "B".

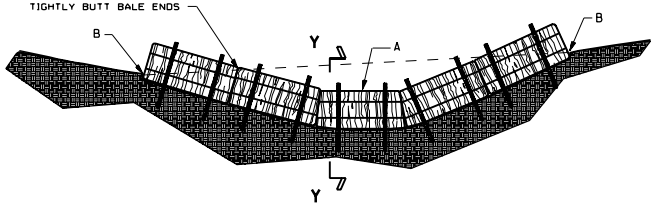


STONE CHECK DAM



SECTION Z - Z

CONSTRUCT THE CHECK DAM SO THAT POINT "A" IS A MINIMUM OF 100 mm LOWER THAN POINT "B".



STRAW OR HAY BALE CHECK DAM

GENERAL NOTES:

1. PLACE CHECK DAMS PERPENDICULAR TO THE FLOWLINE OF THE DITCH.
2. DO NOT PLACE CHECK DAMS ACROSS NATURAL STREAM BEDS.
3. CONSTRUCT CHECK DAMS TO ENSURE WATER DOES NOT FLOW AROUND THE ENDS OF THE DAM.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			
1	02/25/99	T.J.	TOTALLY REVISED DRAWINGS
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

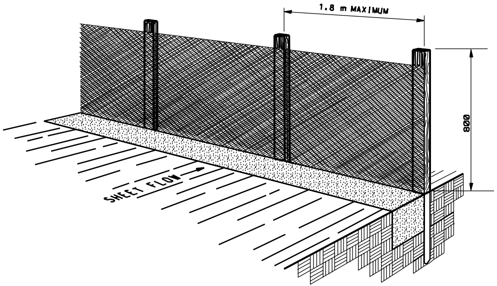
RECOMMENDED FOR APPROVAL — APR.13,1999 DATE
CHAIRMAN, STANDARDS COMMITTEE — APR.13,1999 DATE
DEPUTY DIRECTOR

(METRIC)

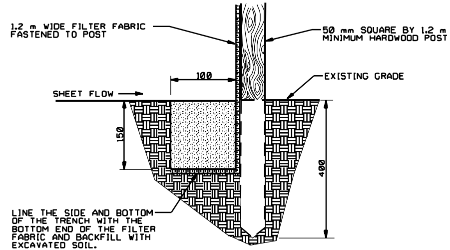
STANDARD DRAWING TITLE
TEMPORARY EROSION CONTROL (CHECK DAMS)

STD. DWG. NO.
1010

SILT FENCE



PERSPECTIVE VIEW



SECTION

GENERAL NOTES:

1. WHERE POSSIBLE, LAYOUT THE SILT FENCE 1.5 m TO 3.0 m BEYOND THE TOE OF SLOPE.
2. ALIGN THE FENCE ALONG THE CONTOUR AS CLOSE AS POSSIBLE.
3. WHEN EXCAVATING THE TRENCH, USE MACHINERY THAT WILL PRODUCE NO MORE THAN THE DESIRED DIMENSIONS.
4. EXTEND THE BOTTOM 400 mm OF FILTER FABRIC TO LINE ALL THREE SIDES OF THE TRENCH.
5. TO AVOID EXCESSIVE PONDING OF WATER AT LOW POINTS ALONG THE FENCE, PROVIDE AN OPENING IN THE SILT FENCE AND INSTALL A CHECK DAM.
6. AVOID USING JOINTS ALONG THE FENCE AS MUCH AS POSSIBLE. IF A JOINT IS NECESSARY, SPLICE THE FILTER FABRIC AT A POST WITH A 150 mm OVERLAPS AND SECURELY FASTEN BOTH ENDS TO THE POST.
7. MAINTAIN A PROPERLY FUNCTIONING SILT FENCE THROUGHOUT THE DURATION OF THE PROJECT OR UNTIL DISTURBED AREAS HAVE BEEN VEGETATED.
8. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS

1	02/25/99	T.J.	TOTALLY REVISED DRAWINGS	
			REMARKS	APPR.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

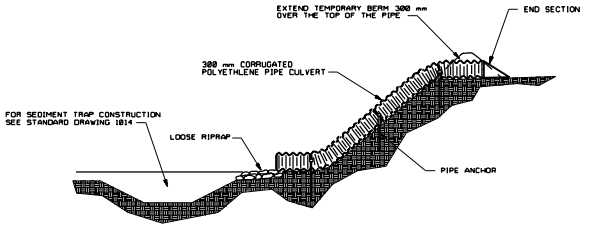
RECOMMENDED FOR APPROVAL
APR.13,1999 DATE
CHAIRMAN STANDARDS COMMITTEE

APPROVED
APR.13,1999 DATE
DEPUTY DIRECTOR

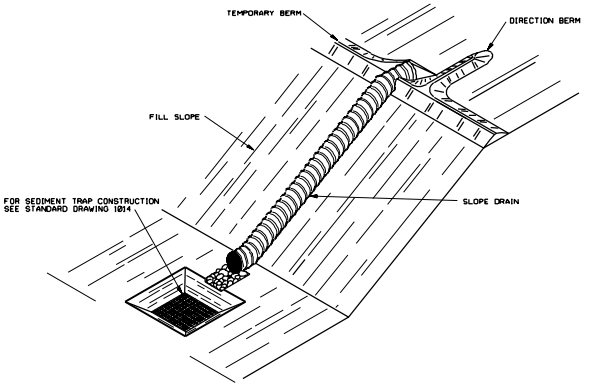
(METRIC)
TEMPORARY
EROSION CONTROL
(SILT FENCE)
STANDARD DRAWING TITLE

STD. DWG. NO.
1011

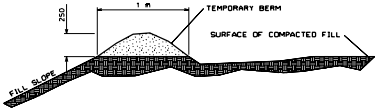
SLOPE DRAIN AND TEMPORARY BERM



SLOPE DRAIN SECTION



SLOPE DRAIN ISOMETRIC



TEMPORARY BERM

GENERAL NOTES FOR TEMPORARY BERM:

1. COMPACT THE RIDGE OF EXISTING SOIL TO PROVIDE A NON-ERODIBLE BERM THAT DIVERTS STORM RUNOFF FROM RECENTLY CONSTRUCTED SLOPES. REPAIR ANY EROSION OF THE BERM IMMEDIATELY.
2. TEMPORARY BERMS ARE TYPICALLY USED IN CONJUCNCTION WITH SLOPE DRAINS.

GENERAL NOTES FOR SLOPE DRAIN:

1. COMPACT THE SOIL SURFACE AND BERMS AROUND THE ENTRANCE TO THE PIPE END SECTION TO PREVENT WATER FROM UNDERMINING THE PIPE AND ERODING THE SLOPE. REPAIR ANY EROSION AROUND THE INLET, OUTLET OR SLOPE IMMEDIATELY.
2. ANCHOR THE PIPE TO THE GROUND EVERY 3 m TO PREVENT PIPE MOVEMENT AND SUBSEQUENT FAILURES DURING STORM EVENTS.
3. USE WATER-TIGHT FITTINGS AT ALL SLOPE DRAIN CONNECTIONS.
4. EXTEND THE DRAIN A MINIMUM OF 1 m BEYOND THE TOE OF THE SLOPE AND PROVIDE OUTLET PROTECTION.
5. EXTEND THE SLOPE DRAIN AS REQUIRED TO COINCIDE WITH THE HEIGHT OF THE EMBANKMENT.
6. MAINTAIN PROPERLY FUNCTIONING SLOPE DRAINS UNTIL SLOPES HAVE BEEN PERMANENTLY STABILIZED.
7. 50 PERCENT OF THE RIPRAP TO BE BETWEEN 150 mm AND 200 mm WITH A MAXIMUM SIZE OF 300 mm AND A MINIMUM SIZE OF 100 mm.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS
1	97/26-99	T.J.	TOTALLY REVISED DRAWINGS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

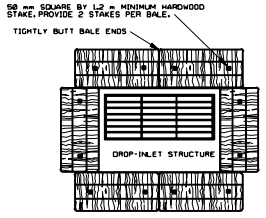
RECOMMENDED FOR APPROVAL: APR.13,1999 DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED: APR.13,1999 DATE
DEPUTY DIRECTOR

(METRIC)
TEMPORARY EROSION CONTROL (SLOPE DRAIN AND TEMPORARY BERM)
STANDARD DRAWING TITLE

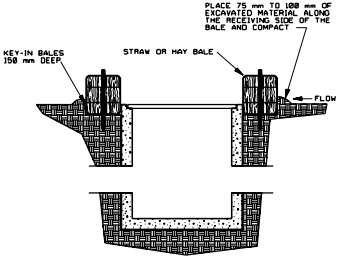
STD. DWG. NO.
1012

DROP-INLET BARRIERS

STRAW AND HAY BALE DROP-INLET BARRIER



PLAN VIEW

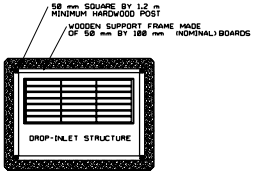


SECTION

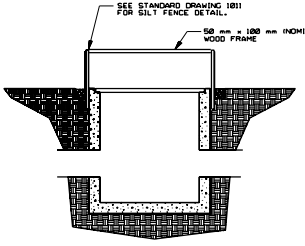
GENERAL NOTES:

1. KEY-IN BALES IN AN EXCAVATED TRENCH AROUND THE PERIMETER OF THE DROP INLET STRUCTURE THAT IS 150 mm DEEP BY A BALES WIDTH WIDE.
2. OVERLAP ON CORNERS MUST BE AT LEAST HALF A BALE WIDE.
3. DEPENDING ON THE SIZE OF THE INLET STRUCTURE, MORE BALES THAN SHOWN MAY BE REQUIRED.
4. IN MEDIAN AREAS, CONSTRUCT SO THAT THE TOPS OF THE BALES ARE NOT HIGHER THAN THE ADJACENT ROADWAY.
5. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT BARRIER THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE INLET HAVE BEEN PAVED OR VEGETATED.
6. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

SILT FENCE DROP-INLET BARRIER



PLAN VIEW

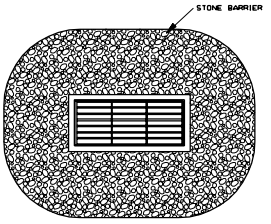


SECTION

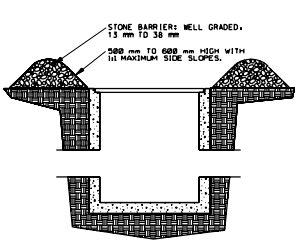
GENERAL NOTES:

1. EXCAVATE A TRENCH AROUND THE CORNER THE PERIMETER OF THE DROP-INLET THAT IS 150 mm DEEP AND 100 mm WIDE.
2. DRIVE POSTS AT EACH CORNER OF THE INLET STRUCTURE. IF THE DISTANCE BETWEEN CORNER POSTS EXCEEDS 1.2 m, PLACE ANOTHER POST(S) BETWEEN THEM.
3. CONNECT THE TOPS OF ALL THE POSTS WITH A WOODEN SUPPORT FRAME MADE OF 50 mm BY 100 mm BOARDS. USE NAILS OR SCREWS FOR FASTENING.
4. IN MEDIAN AREAS, CONSTRUCT SO THAT THE TOP OF THE SILT FENCE IS NOT HIGHER THAN THE ADJACENT ROADWAY.
5. MAINTAIN A PROPERLY FUNCTIONING SILT FENCE BARRIER THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE INLET HAVE BEEN PAVED OR VEGETATED.
6. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

STONE DROP-INLET BARRIER



PLAN VIEW



SECTION

GENERAL NOTES:

1. PLACE STONE BARRIER AS SHOWN AROUND THE INLET OPENING.
2. IN MEDIAN AREAS, CONSTRUCT SO THAT THE TOP OF THE STONE BARRIER IS NOT HIGHER THAN THE ADJACENT ROADWAY.
3. MAINTAIN A PROPERLY FUNCTIONING STONE BARRIER THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE INLET HAVE BEEN PAVED OR VEGETATED.
4. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS
1.	02/26/99	T.J.	TOTALLY REVISED DRAWINGS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

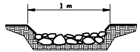
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — DATE APR.13,1999
APPROVED
DEPUTY DIRECTOR — DATE APR.13,1999

(METRIC)

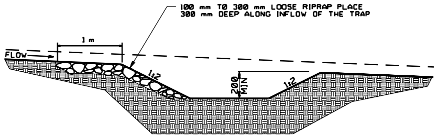
STANDARD DRAWING TITLE
TEMPORARY EROSION CONTROL (DROP-INLET BARRIERS)

STD. DWG. NO.
1013

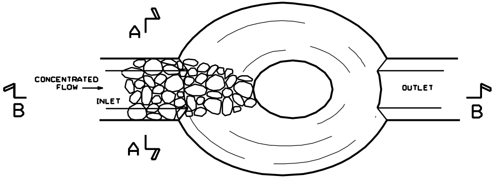
SEDIMENT TRAP



SECTION A - A



SECTION B - B

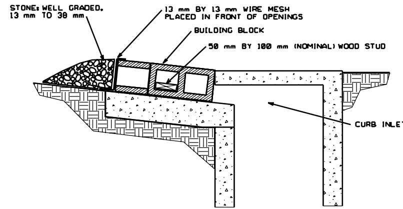


PLAN VIEW

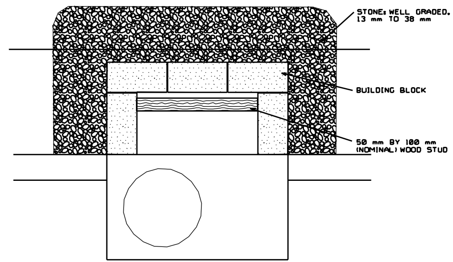
GENERAL NOTES:

1. PLACE SEDIMENT TRAPS AT LOCATIONS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
2. THE STORAGE CAPACITY OF EACH SEDIMENT TRAP WILL BE IDENTIFIED IN THE PROJECT PLAN SET.
3. CONSTRUCT TRAP LENGTH TWICE AS LONG AS THE WIDTH.
4. MAINTAIN A PROPERLY FUNCTIONING SEDIMENT TRAP THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE BASIN HAVE BEEN PAVED OR VEGETATED.
5. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

CURB INLET BARRIER



SECTION



PLAN VIEW

GENERAL NOTES:

1. PLACE BUILDING BLOCKS, WIRE MESH AND STONE AS SHOWN AROUND THE CURB INLETS.
2. MAINTAIN A PROPERLY FUNCTIONING STONE BARRIER THROUGHOUT CONSTRUCTION OR UNTIL DISTURBED AREAS CONTRIBUTING TO THE INLET HAVE BEEN PAVED OR VEGETATED.
3. REMOVE SEDIMENT AS IT ACCUMULATES AND PLACE IT IN A STABLE AREA APPROVED BY THE ENGINEER.

ALL DIMENSIONS ARE EXPRESSED IN MILLIMETERS UNLESS OTHERWISE NOTED.

REVISIONS

1	03/02/99	T.J.	TOTALLY REVISED DRAWINGS	
				APPR.
				REMARKS

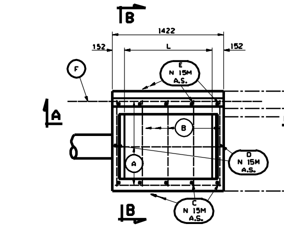
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE
APR.13,1999
DATE

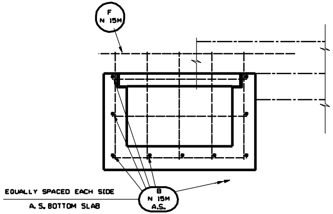
APPROVED
DEPUTY DIRECTOR
APR.13,1999
DATE

(METRIC)
TEMPORARY EROSION CONTROL
(SEDIMENT TRAP AND CURB INLET BARRIER)
STANDARD DRAWING TITLE

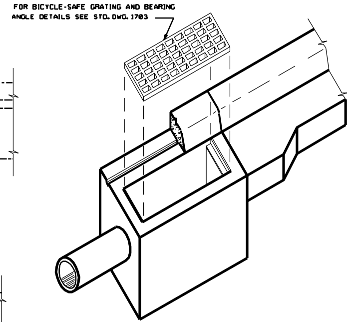
STD. DWG. NO.
1014



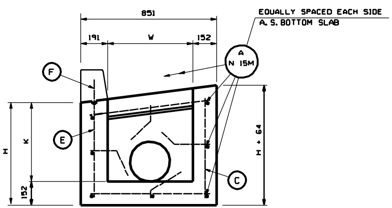
PLAN VIEW



SECTION A-A



ISOMETRIC VIEW



SECTION A-A

GENERAL NOTES

1. ALL REINFORCING STEEL SHALL BE COATED, DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO DESIGNATION M 284M OR M 111 AND M 31M, GRADE 400.
2. STRUCTURAL STEEL FOR GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 (ASTM A 709M, GRADE 250)
3. FOR GRATING AND BEARING DETAILS SEE STANDARD DRAWING 1703
4. A UNIT CATCH BASIN SHALL INCLUDE GRATING, BEARING ANGLES, AND BOX COMPLETE.
5. ALL CAST-IN-PLACE CONCRETE SHALL BE CONCRETE CLASS AA(AE) EXCEPT WHERE NOTED OTHERWISE IN THE SPECIAL PROVISIONS.
6. TYPE II CEMENT (LOW ALKALI) SHALL BE USED UNLESS SPECIFIED OTHERWISE IN SPECIAL PROVISIONS.

DESIGN DATA

MS 18 (HS 20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH AASHTO AND INTERIM SPECIFICATIONS.

STRUCTURAL CONCRETE: Fc = 10 MPa, REINF. STEEL: Fs = 160 MPa
STRUCTURAL STEEL: Fs = 138 MPa N = 8

QUANTITIES

SEE SCHEDULE OF INSTALLATION

NOTES

1. CONCRETE QUANTITIES FOR CURB & GUTTER SHALL BE INCLUDED IN ROADWAY QUANTITIES.
2. CONCRETE DISPLACED BY PIPE(S) (TABLE "A") SHALL BE DEDUCTED FROM CONCRETE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION
3. CUT AND BEND REINFORCING STEEL AS NECESSARY TO CLEAR PIPE(S) AND MAINTAIN 50 mm CLEARANCE.
4. FOR LOCATION AND SIZE OF PIPE(S) SEE ROADWAY PLANS.
5. QUANTITIES IN TABLE "A" ARE FOR PIPE THROUGH 150 mm WALL THICKNESS

SCHEDULE OF INSTALLATION

LINE NO	DIMENSIONS				MAX. PIPE DIA.		REINFORCING STEEL												QUANTITIES	
							A		B		C		D		E		F		REINF. STEEL	CONC.
	H	W	L	K	RCP	CMP	N	LENGHT	N	LENGHT	N	LENGHT	N	LENGHT	N	LENGHT	N	LENGHT	Kg	cu m
1	610	508	1118	457	—	375	7	1321	9	737	5	533	2	508	5	610	1	1234	38.8	.50
2	762			610	300	450	9		11			686		660		762			48.2	.60
3	914			762	375		9		11			838		813		914			51.1	.71
4	1067			914			11		13			991		965		1067			60.4	.81
5	1219			1067			11		13			1143		1118		1219			63.3	.93
6	1372			1219			13		15			1295		1270		1372			72.6	1.03
7	1524	508	1118	1372	375	450	13	1321	15	737	5	1448	2	1422	5	1524	1	2134	75.5	1.14

TABLE "A"

RCP		CMP	
DIA.	m3	DIA.	m3
300	.013	300	.011
375	.028	375	.018
		450	.025

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

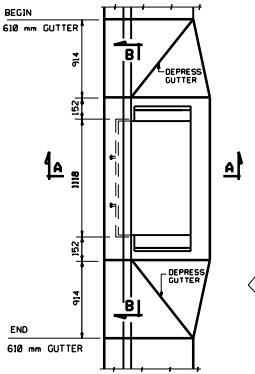
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 1 OF 1

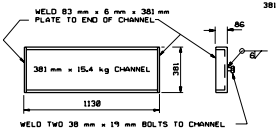
STANDARD CATCH BASIN

STANDARD DRAWING TITLE

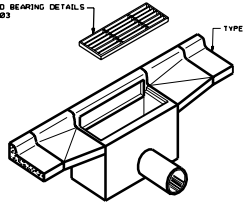
STD. DWG. NO.
1329

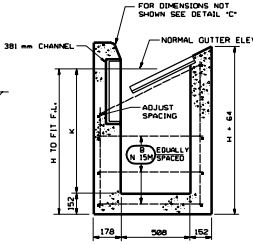


PLAN

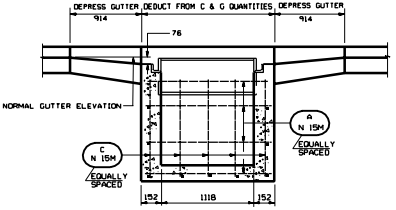


CHANNEL DETAIL

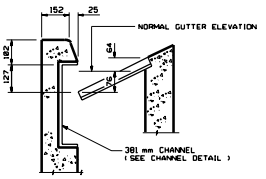




SECTION A-A



SECTION B-B



DETAIL "C"

GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO DESIGNATION M 284M OR M 111 AND M 31M GRADE 400

2- STRUCTURAL STEEL FOR GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250.

3- CHANNEL AND END PLATES SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111.

4- EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 20 mm EXCEPT WHERE NOTED OTHERWISE.

5- COVER TO REINFORCING STEEL SHALL BE 50 mm EXCEPT WHERE NOTED OTHERWISE.

6- ALL CAST-IN-PLACE CONCRETE SHALL BE CLASS AA(AE) EXCEPT WHERE SPECIFIED OTHERWISE.

7- TYPE II CEMENT (LOW ALKALI) REQUIRED.

DESIGN DATA

MS 18 (HS 28-44) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

STRUCTURAL STEEL: F_s = 138 MPa

STRUCTURAL CONCRETE: F_c' = 10 MPa
F_s = 160 MPa
N = 8

QUANTITIES

SEE SCHEDULE OF INSTALLATION

NOTES:

1- CONCRETE QUANTITIES FOR CURB AND GUTTER SHALL BE INCLUDED IN ROADWAY QUANTITIES

2- FOR LOCATION AND SIZE OF PIPE(S) SEE ROADWAY PLANS.

3- CUT AND/OR BEND REINFORCING STEEL AS NECESSARY TO CLEAR PIPES AND MAINTAIN 50 mm CLEARANCE.

4- CONCRETE DISPLACED BY PIPES (TABLE "A") SHALL BE DEDUCTED FROM CONCRETE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION.

5- QUANTITIES IN TABLE "A" ARE FOR PIPE THROUGH 150 mm WALL THICKNESS.

SCHEDULE OF INSTALLATION

LINE	DIMENSIONS		MAXIMUM PIPE DIA.		REINFORCING STEEL						REIN. STEEL	CONC.
					A			B		C		
	H	K	RCP	CMP	N	L (mm)	N	L (mm)	N	L (mm)	kg	m^3
1	610	457	——	375	7	1321	9	737	12	533	35.0	0.48
2	762	610	300	450	9	1321	11	737	12	686	44.3	0.57
3	914	762	375	450	9	1321	11	737	12	838	47.1	0.67
4	1067	914	375	450	11	1321	13	737	12	991	56.5	0.76
5	1219	1067	375	450	11	1321	13	737	12	114	59.4	0.86
6	1372	1219	375	450	13	1321	15	737	12	1295	68.7	0.96
7	1524	1372	375	450	13	1321	15	737	12	1448	71.6	1.05

TABLE "A"

RCP		CMP	
DIA. mm	m^3	DIA. mm	m^3
300	0.018	300	0.011
375	0.028	375	0.018
		450	0.025

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | BY | DATE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

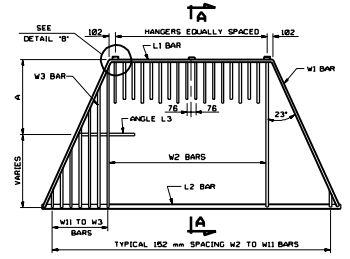
RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — MARCH 1999
APPROVED
DEPUTY DIRECTOR — MARCH 1999
DATE

(METRIC)
SHT. 1 OF 1

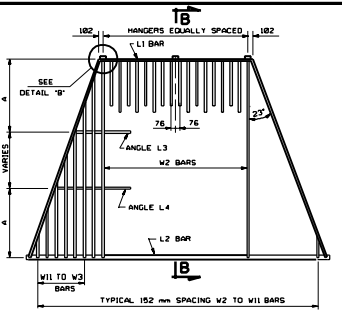
CURB INLET CATCH BASIN

STANDARD DRAWING TITLE

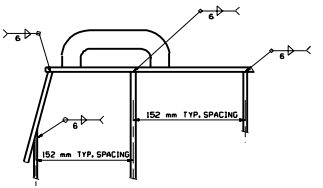
STD. DWG. NO.
1330



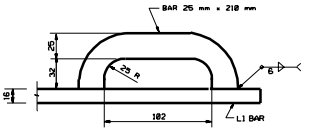
STEEL GRATING DETAIL



STEEL GRATING DETAIL

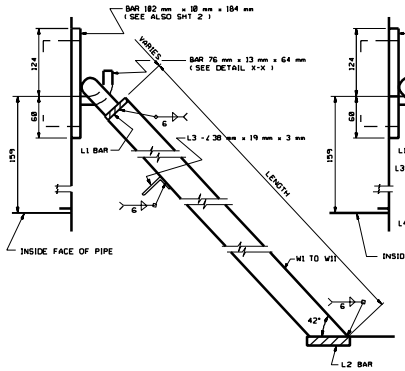


DETAIL "B"

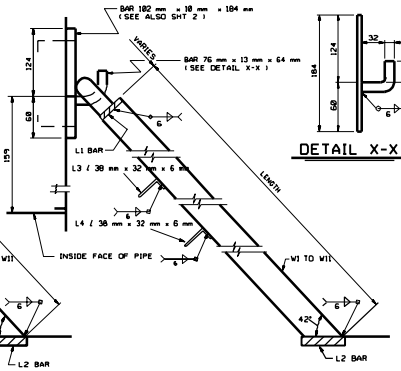


HANGER ROD DETAIL

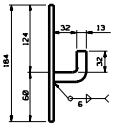
(WEIGHT OF HANGER RODS 0.835 Kg. EACH)



SECTION A-A



SECTION B-B



DETAIL X-X

GENERAL NOTES

1. ALL STRUCTURAL STEEL SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 (ASTM A 709M, GRADE 250) AND SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.
2. ALL STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111 (ASTM A 123)

DESIGN DATA

THE DESIGN IS IN ACCORDANCE WITH AASHTO AND INTERIM SPECIFICATIONS:
F_{sr} 138 MPa
LIVE LOAD - MS 18 (HS 20)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | NO. | DATE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — MARCH 31, 1995 DATE
APPROVED
DEPUTY DIRECTOR — MARCH 31, 1995 DATE

(METRIC)
SHT. 1 OF 3

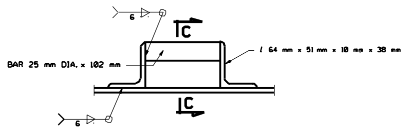
STANDARD TRASH RACKS
90° X-ING L

STANDARD DRAWING TITLE

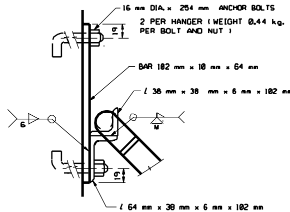
STD. DWG. NO.
1384-1

LINE	BOX CULVERTS	CORRUGATED METAL PIPES	CORRUGATED PIPE ARCHES	CONCRETE PIPE	MULTI-PLATE ELLIPSES	MULTI-PLATE PIPE ARCHES	A	TRANSVERSE BARS 1- EACH REQUIRED L1 LENGTH	L1 THICKNESS	L1 WIDTH	L2 LENGTH	L2 THICKNESS	L2 WIDTH	L3 LENGTH	L4 LENGTH
1		457	737 × 457	457			432	432	6	32	1213	13	41	813	0
2							432	711			1489			1092	
3		533		533			483	508			1384			940	
4		610		610			559	584			1556			1067	
5			914 × 559				559	889			1797			1372	
6				686			610	660			1730			1194	
7			1092 × 686				610	1067			2137			1600	
8			1270 × 787				686	1245			2448			1029	
9	610 × 610						559	584			1559			1067	
10		762		762			660	737			1905			1321	
11	914 × 610						559	889			1864			1372	
12	1219 × 610						559	1194			2169			1676	
13	1524 × 610						559	1499			2473			1981	
14	1829 × 610						559	1803			2778			2286	
15	2134 × 610						559	2108			3083			2591	
16	2438 × 610						559	2413			3388			2896	
17				838			737	813	6		2080			1448	
18		914		914			787	889	10		2240			1575	
19			1473 × 914				787	1448			2807			2134	
20	914 × 914						787	889			2240			1575	
21				991			838	965			2423			1782	
22		1067		1067			889	1041			2597			1803	
23	1219 × 914						787	1194			2553			1880	
24	1524 × 914						787	1499			2858			2184	
25			1651 × 1016				864	1626			3118			2362	
26	1829 × 914						787	1803			3162			2489	
27			1829 × 1118				940	1883			3426			2616	
28	2134 × 914						787	2108			3467			2794	
29	2438 × 914						787	2413			3772			3099	
30	2743 × 914						787	2718			4077			3404	
31	3048 × 914						787	3023			4382			3708	
32	3353 × 914						787	3327			4686			4013	
33	3658 × 914						787	3632	10	32	4991		41	4318	
34		1219		1219			1016	1194	6	38	2950		51	2083	
35	1219 × 1219						1016	1194			2950			2083	
36		1372		1372			1118	1346			3299			2311	
37	1524 × 1219						1016	1499			3254			2388	
38	1829 × 1219							1803			3659			2692	
39	2134 × 1219							2108			3864			2997	
40	2438 × 1219							2413			4169			3302	
41	2143 × 1219							2718			4474			3607	
42	3048 × 1219							3023			4778			3912	
43	3353 × 1219							3327			5083			4216	
44	3658 × 1219						1016	3632	6	38	5388	13	51	4521	0

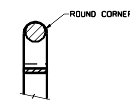
LINE	MAIN BARS 2- EACH W1 LENGTH	W2 LENGTH	W2 NO.	2-EACH REQUIRED W3 LENGTH	W4 LENGTH	W5 LENGTH	W6 LENGTH	W7 LENGTH	W8 LENGTH	W9 LENGTH	W10 LENGTH	W11 LENGTH	W1 TO W11 THICKNESS	W1 TO W11 WIDTH	NO. OF HANGER AND HANGER RODS (SPACED EQUALLY)	WEIGHT OF STRUCT. STEEL Kg.
1	984	905	2	867	511	156							6	32	2	25.3
2	984	905	4	838	403	127										30.6
3	1108	1019	4	718	362											29.3
4	1232	1133	4	921	565	210										33.8
5	1149	1057	6	845	489	133										38.3
6	1359	1248	4	1124	768	413										38.3
7	1359	1248	6	1241	886	530	175									47.9
8	1524	1400	8	1245	889	533	178									57.1
9	1232	1133	4	921	565	210										33.8
10	1483	1362	4	1327	972	616	260									43.6
11	1232	1133	6	921	565	210										40.4
12	1232	1133	8	921	565	210										47.0
13	1232	1133	10	921	565	210										53.6
14	1232	1133	12	921	565	210									2	60.2
15	1232	1133	14	921	565	210									3	69.4
16	1232	1133	16	921	565	210									3	76.0
17	1607	1476	6	1175	819	464									3	51.3
18	1724	1584	6	1368	1013	657	302								2	55.0
19	1724	1584	10	1311	956	600	244									70.5
20	1724	1584	6	1368	1013	657	302									55.1
21	1848	1699	6	1575	1219	864	508	152								61.2
22	1972	1813	6	1775	1419	1064	708	352								67.4
23	1724	1584	8	1368	1013	657	302									63.4
24	1724	1584	10	1368	1013	657	302									71.0
25	1889	1737	10	1670	1314	959	603	240							2	81.7
26	1724	1584	12	1372	1016	660	305								3	82.0
27	2054	1889	12	1673	1318	962	606	251								96.3
28	1724	1584	14	1368	1013	657	302									91.1
29	1724	1584	16	1368	1013	657	302									99.5
30	1724	1584	18	1368	1013	657	302									107.8
31	1724	1584	20	1368	1013	657	302								3	117.2
32	1724	1584	22	1368	1013	657	302								4	127.1
33	1724	1584	24	1368	1013	657	302								4	135.5
34	2232	2051	8	1838	1483	1127	772	416							4	88.9
35	2232	2051	8	1838	1483	1127	772	416						32	5	91.5
36	2480	2280	8	2242	1886	1530	1175	819	464					38	2	111.7
37	2232	2051	10	1838	1483	1127	772	416						32	2	93.7
38			12												2	103.7
39			14												2	113.8
40			16												3	126.5
41			18												3	136.6
42			20												3	146.6
43			22												4	159.3
44	2232	2051	24	1838	1483	1127	772	416					6	32	4	169.4



ALTERNATE HANGER ROD DETAIL



ALTERNATE FOR SEC. A-A & B-B



SECTION C-C

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | DATE | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 2 OF 3

STANDARD TRASH RACKS
STANDARD DRAWING TITLE

STD. DWG. NO.
1384-2

TO BE USED FOR (NOM.SIZE)								TRANSVERSE BARS								MAIN BARS															
								1- EACH REQUIRED								2- EA.	W2		2-EACH REQUIRED									W1 TO W11		NO. OF HANGER AND HANGER RODS (SPACED EQUALLY)	WEIGHT OF STRUCT. STEEL
LINE	BOX CULVERTS	CORRUGATED METAL PIPES	CORRUGATED PIPE ARCHES	CONCRETE PIPE	MULTI-PLATE ELLIPSES	MULTI-PLATE PIPE ARCHES	A	L1 LENGTH	L1 THICKNESS	L1 WIDTH	L2 LENGTH	L2 THICKNESS	L2 WIDTH	L3 LENGTH	L4 LENGTH	W1 LENGTH	W2 LENGTH	W2 NO.	W3 LENGTH	W4 LENGTH	W5 LENGTH	W6 LENGTH	W7 LENGTH	W8 LENGTH	W9 LENGTH	W10 LENGTH	W11 LENGTH	THICKNESS	WIDTH		Kg.
45	3962 × 1219						1016	3937	6	38	5693	13	51	4826	0	2232	2051	26	1838	1483	1127	772	416					6	32	4	179.4
46	4267 × 1219							4242			5998			5131				28												5	192.1
47	4572 × 1219							4547			6302			5436				30												5	202.2
48	4877 × 1219						1016	4851			6607			5740	0	2232	2051	32	1838	1483	1127	772	416						32	5	212.2
49						1854 × 1397	762	1829			3816			2489	3162	2524	2318	12	2134	1778	1422	1067	711	356					38	6	153.8
50						1930 × 1440	813	1905	6		3959			2604	3264	2607	2394	12	2299	1943	1588	1232	876	521	165					6	162.2
51		1524		1524			813	1499	10		3645			2197	2946	2721	2502	10	2286	1930	1575	1219	864	508	152					2	148.9
52					1422 × 1575		838	1397			3610			2121	2896	2807	2578	10	2245	1889	1534	1178	822	467						2	148.3
53						2057 × 1499	813	2032			4150			2731	3454	2686	2467	14	2162	1807	1451	1095	740	384						3	166.6
54						2134 × 1549	838	2108			4293			2832	3581	2769	2543	14	2330	1975	1619	1264	908	552	197	197				3	175.6
55						2210 × 1600	864	2184			4429			2921	3683	2848	2616	14	2492	2137	1781	1426	1070	714	359					3	184.0
56	1524 × 1524						813	1499			3645			2197	2946	2724	2502	10	2286	1930	1575	1219	864	508	152					2	148.9
57		1676		1676			889	1651			3994			2413	3226	2962	2724	10	2686	2330	1975	1619	1264	908	552					3	164.9
58	1829 × 1524						889	1803			3950			2565	3188	2721	2489	12	2261	1930	1575	1219	864	508	152					4	160.8
59	2134 × 1524							2108			4255			2870	3493			14												3	172.7
60	2438 × 1524							2413			4559			3175	3797			16												3	187.2
61	2743 × 1524							2718			4864			4380	4102			18												3	201.8
62	3048 × 1524							3023			5169			3785	4407			20												4	218.9
63	3353 × 1524							3327			5474			4089	4712			22												4	233.5
64	3658 × 1524							3632			5779			4394	5017			24												4	247.9
65	3962 × 1524							3937			6083			4699	5321			26												5	265.2
66	4267 × 1524							4242			6388			5004	5626			28												5	279.7
67	4572 × 1524							4547			6693			5309	5931			30												5	294.2
68	4877 × 1524						889	4851			6998			5613	6236	2721	2489	32	2261	1930	1575	1219	864	508	152					6	311.4
69					1575 × 1727		914	1549			3959			2337	3175	3054	2807	10	2651	2296	1940	1584	1229	873	518	162				6	172.7
70						2337 × 1651	889	2311			4623			3073	3681	2931	2692	16	2359	2003	1648	1292	937	581	226					3	196.0
71						2413 × 1702	914	2388			4763			3175	3988	3013	2769	16	2524	2169	1813	1457	1102	746	391					3	205.1
72						2489 × 1753	965	2464	10		4905			3277	4077	3096	2845	16	2609	2334	1978	1622	1267	911	556	200			38	3	214.9
73		1829		1829			965	1803	13		4340			2642	3505	3216	2956	12	2743	2388	2032	1676	1321	965	610	254			44	4	214.5
74					1702 × 1905		1016	1676			4312			2553	3442	3340	3070	10	3064	2708	2353	1997	1641	1286	930	575	219			4	216.7
75						2616 × 1803	965	2591			5096			3429	4267	3175	2918	16	2911	2556	2200	1845	1489	1133	778	422				4	258.9
76						2692 × 1854	991	2667			5236			3518	4382	3260	2994	10	2721	2365	2010	1654	1299	943	587	232				4	270.5
77						2845 × 1905	1016	2819			5455			3696	4585	3340	3070	18	2975	2619	2264	1908	1553	1197	841	486				4	286.7
78						2896 × 1956	1041	2870			5572			3759	4674	3423	3146	18	3112	2756	2400	2045	1689	1334	978	622	267			3	295.3
79	1829 × 1829						965	1803			4340			2642	3518	3216	2956	12	2743	2388	2032	1676	1321	965	610	254				3	211.8
80	2134 × 1829							2108			4645			2946	3823			14												3	230.5
81	2438 × 1829							2413			4950			3251	4128			16												3	249.1
82	2743 × 1829							2718			5255			3556	4433			18												4	270.3
83	3048 × 1829							3023			5559			3861	4737			20												4	288.9
84	3353 × 1829							3327			5864			4166	5042			22												4	307.5
85	3658 × 1829							3632			6169			4470	5347			24												5	328.8
86	3963 × 1829							3937			6474			4775	5652			26												5	347.4
87	4267 × 1829							4242			6779			5080	5956			28												5	366.0
88	4572 × 1829							4547			7083			5385	6261			30												6	387.2
89	4877 × 1829					2438 × 1880	965	4851			7388			5690	6566	3216	2956	32	2743	2388	2032	1676	1321	965	610	254				6	405.8
90							991	2413	13	38	5020	13	51	3264	4166	3302	3036	15	2997	2642	2286	1930	1575	1219	864	508		6	44	3	245.3

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REVISIONS | REMARKS | APPR. | NO.

UTAH DEPARTMENT OF TRANSPORTATION
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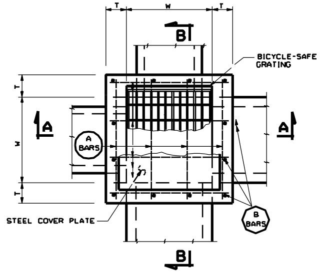
SALT LAKE CITY, UTAH

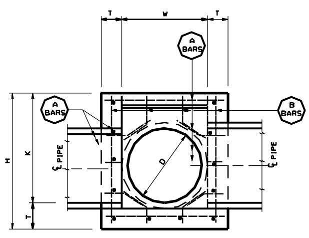
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 3 OF 3
STANDARD TRASH RACKS
STANDARD DRAWING TITLE

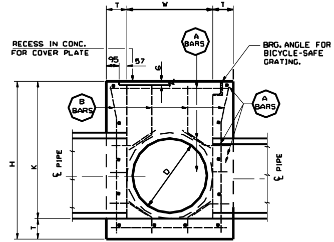
STD. DWG. NO.
1384-3



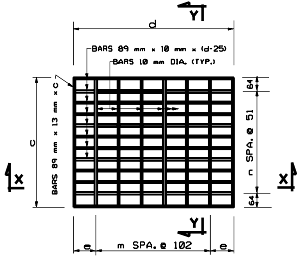
PLAN



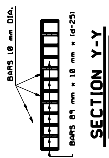
SECTION A-A



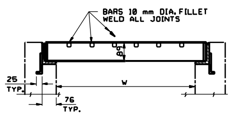
SECTION B-B



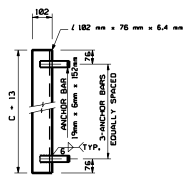
PLAN (GRATING)



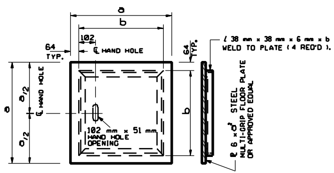
SECTION Y-Y



SECTION X-X



BICYCLE-SAFE GRATING



STEEL COVER PLATE DETAILS

GENERAL NOTES

1. ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO M 284M OR M 111 AND M 31M GRADE 400.
2. STRUCTURAL STEEL GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO M 270M, GRADE 250.
3. GRATING AND FRAME SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO M 111.
4. TYPE II CEMENT (LOW ALKALI), STRUCTURAL CONCRETE REQ'D.
5. PIPES AND BOX TO BE ARRANGED TO SUIT CONDITIONS. CUT AND BEND BARS WHERE NECESSARY TO CLEAR PIPE. ALL BARS TO BE 15M @ 305 mm PLUS OR MINUS.
6. COVER PLATE ALTERNATE FOR GRATING. COVER PLATE IS NOT DESIGNED FOR WHEEL LOAD. (SEE STANDARD DRAWING 1567 FOR SOLID COVER FOR MS 18 (HS-20) LOADING.)
7. CONCRETE DISPLACED BY PIPE(S) SHALL BE DEDUCTED FROM THOSE CONCRETE QUANTITIES GIVEN IN SCHEDULE #1.

INDEX OF SHEETS

DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

LIVE LOAD: MS 18

Fc = 10 MPa
Fs = 160 MPa
Fs = 138 MPa
N = 8

DIMENSIONS & QUANTITIES

(SEE SCHEDULES ON SHEET 4 OF 6)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.		APPR.	REMARKS

REVISIONS

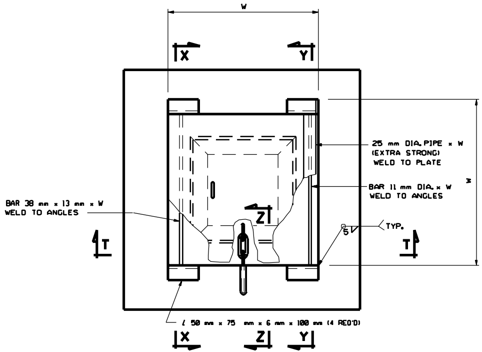
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — MAR.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 1 OF 6

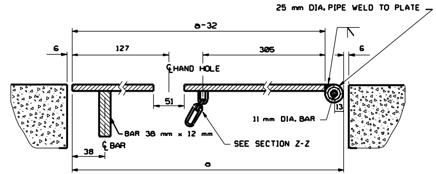
STANDARD DIVERSION BOX /COVER PLATE/GRATING FOR 450 mm DIA. OR 600 mm DIA. PIPE
STANDARD DRAWING TITLE

STD. DWG. NO.
1551-1

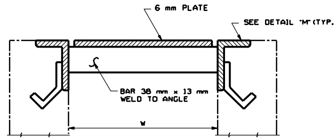


PLAN

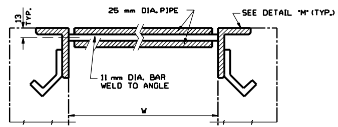
DETAILS OF SHEET COVER PLATE
(SECTION Z-Z IS ON SHEET 3)



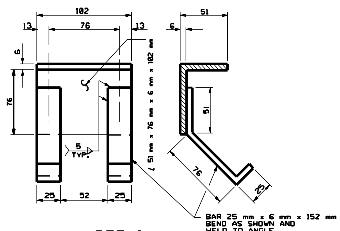
SECTION T-T



SECTION X-X



SECTION Y-Y



DETAIL "M"

HINGED LID DETAILS

DIMENSION & QUANTITIES

(SEE SCHEDULE ON SHEET 4 OF 6)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | APPR. | NO.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED

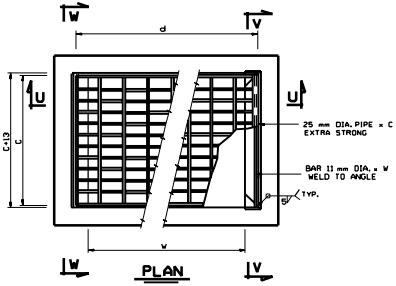
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 2 OF 6

STANDARD DIVERSION BOX
HINGED LID DETAILS
FOR 450 mm DIA.
OR 600 mm DIA. PIPE

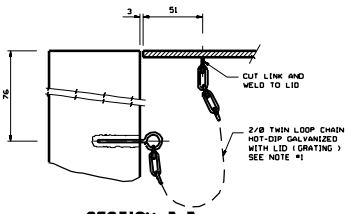
STANDARD DRAWING TITLE

STD. DWG. NO.
1551-2



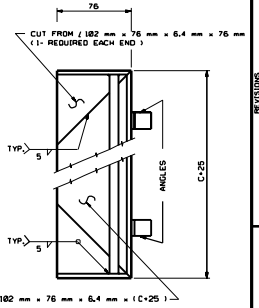
PLAN

DETAIL OF BICYCLE-SAFE GRATING

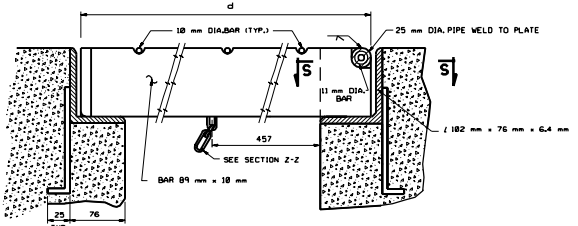


SECTION Z-Z

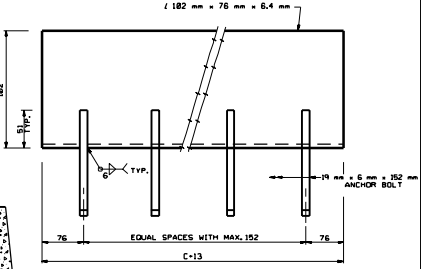
NOTE #1
LENGTH OF CHAIN:
FOR LID: L = 533
FOR GRATING: L = 762



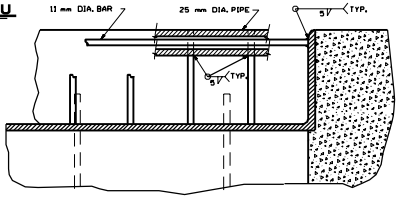
SECTION S-S



SECTION U-U



SECTION W-W



SECTION V-V

DIMENSIONS & QUANTITIES

(SEE SCHEDULES ON SHEET 4 OF 5)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			REMARKS
NO.	DATE	BY	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

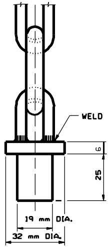
RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — MAR.JR1,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.JR1,1999 DATE

(METRIC)
SHT. 3 OF 6

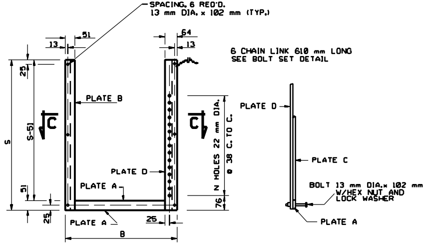
STANDARD DIVERSION BOX
BICYCLE-SAFE GRATING
DETAILS FOR 450 mm DIA.
OR 600 mm DIA. PIPE

STANDARD DRAWING TITLE

STD. DWG. NO.
1551-3



SET BOLT DETAIL



FRAME DETAILS

SCHEDULE NO. 1

LINE	DIMENSIONS H	DIMENSIONS K	DIMENSIONS W	DIMENSIONS T	DIMENSIONS X	REINFORCING STEEL A-BARS LENGTH	REINFORCING STEEL A-BARS NO.	REINFORCING STEEL B-BARS LENGTH	REINFORCING STEEL B-BARS NO.	QUANTITIES REINF. STEEL kg.	QUANTITIES CONC. m³	STRUCTURAL STEEL GRATING kg	STRUCTURAL STEEL COVER PLATE kg	STRUCTURAL STEEL FRAME kg	STRUCTURAL STEEL GATE kg
1	762	610	610	152	0	813	12	635	12	27.3	0.401	80	36	8	12
2	914	762	↑	↑	152	↑	16	787	↑	35.2	0.472	↑	↑	↑	↑
3	1067	915			305		16	940		38.1	0.543				
4	1219	1067			457		20	1092		46.1	0.613				
5	1372	1220			610		20	1245		49.0	0.684				
6	1524	1372			762		24	1397		57.0	0.755				
7	1676	1524			914		24	1549		59.8	0.826				
8	1829	1676			1067		28	1702		67.8	0.897				
9	1981	1829	↓	↓	1219	↓	28	1854	↓	70.7	0.967	↓	↓	↓	↓
10	2134	1982	610	152	1372	813	32	2007	12	78.7	1.038	80	36	8	12
11	914	762	762	152	0	965	16	787	12	39.1	0.589	115	52	10	19
12	1067	915	↑	↑	152	↑	16	940	↑	42.0	0.671	↑	↑	↑	↑
13	1219	1067			305		20	1092		50.9	0.756				
14	1372	1220			457		20	1245		53.8	0.841				
15	1524	1372			610		24	1397		62.7	0.926				
16	1676	1524			762		24	1549		65.5	1.012				
17	1829	1677			914		28	1702		74.5	1.096				
18	1981	1829			1067		28	1854		77.4	1.181				
19	2134	1982	↓	↓	1219	↓	32	2007	↓	86.3	1.266	↓	↓	↓	↓
20	2286	2134	762	152	1372	965	32	2159	12	89.2	1.351	115	52	10	19

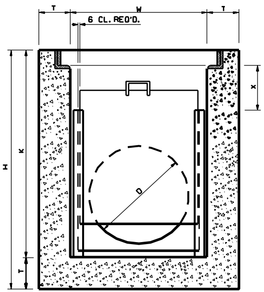
SCHEDULE NO. 2

SEE NOTE 4.

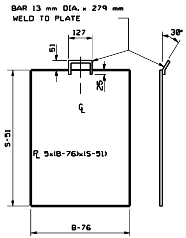
PIPE SIZE	DIMENSIONS AND QUANTITIES: COVER PLATE		BICYCLE-SAFE GRATING					FRAME AND GATE							
D	a	b	c	d	e	m	n	B	S	N	1-PL. A	1-PL. B	2-PL. C	1-PL. D	GATE
450	711	584	584	724	108	5	9	584	610	12	6x51x584	6x51x610	6x25x559	6x64x610	5x521x559
600	864	737	737	876	133	6	12	737	762	15	6x51x737	6x51x762	6x25x711	6x64x762	5x673x711

SEE NOTE 5.

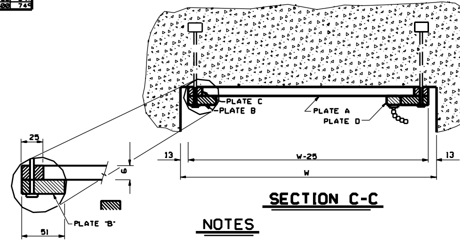
D	a
450	597
600	749



FRAME AND GATE INSTALLATION DETAIL



GATE



SECTION C-C

NOTES

1. ALL CONCRETE QUANTITIES HAVE BEEN CALCULATED FOR BOXES WITH BICYCLE-SAFE GRATING AND NO OPENINGS FOR PIPE(S).
2. FOR SOLID COVER ADD 0.008 m³ OF CONCRETE IN LINES 1 THRU 10 INCLUSIVE AND 0.011 m³ OF CONCRETE IN LINES 11 THRU 20 INCLUSIVE AND DEDUCT 0.041 m³ OF CONCRETE FOR EACH 450 mm DIA. PIPE IN LINES 1 THRU 10 INCLUSIVE AND 0.070 m³ OF CONCRETE FOR EACH 600 mm DIA. PIPE IN LINES 11 THRU 20 INCLUSIVE.
3. IF DIMENSION X IS LESS THAN INSIDE PIPE DIAMETER D, THE GATE(S) CAN ONLY BE PARTIALLY OPENED TO ALLOW THE GRATING OR COVER PLATE TO BE REPLACED.
4. SEE SHEET 1 OF 6 FOR SOLID COVER PLATE DETAILS.
5. SEE SHEET 2 OF 6 FOR HINGED LID DETAILS.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED

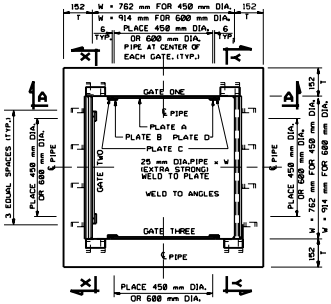
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 4 OF 6

STANDARD DIVERSION BOX
THREE GATE BOX SECTIONS
FOR 450 mm DIA.
OR 600 mm DIA. PIPE

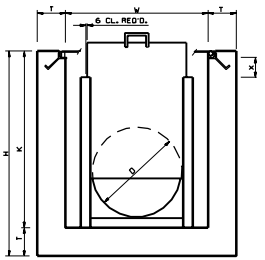
STANDARD DRAWING TITLE

STD. DWG. NO.
1551-4

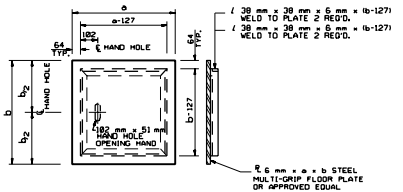


3 GATE PLAN

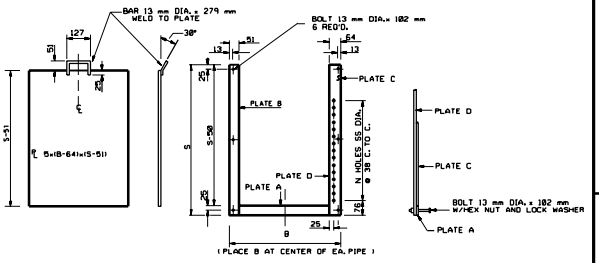
(SECTION X-X Y-Y & B-B ARE ON SHEET 6)



SECTION A-A



STEEL COVER PLATE DETAILS



(PLACE B AT CENTER OF EA. PIPE)

FRAME AND GATE INSTALLATION DETAIL

DIMENSIONS AND QUANTITIES

SEE SCHEDULES ON SHEET 6 OF 6.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			REMARKS
NO.	BY	DATE	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

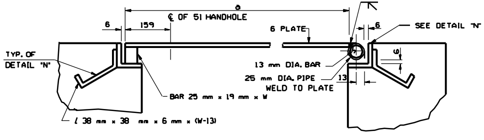
RECOMMENDED FOR APPROVAL — MARCH 25, 1999 — DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MARCH 25, 1999 — DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 5 OF 6

STANDARD DIVERSION BOX
THREE GATE BOX SECTIONS
FOR 450 mm DIA.
OR 600 mm DIA. PIPE

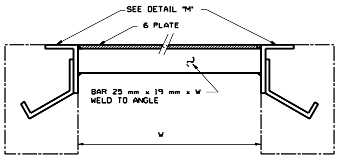
STANDARD DRAWING TITLE

STD. DWG. NO.
1551-5



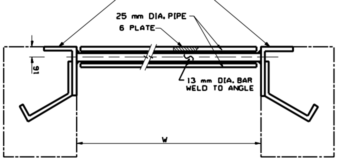
SECTION B-B

(SECTION IS TAKEN FROM SHEET 5)



SECTION X-X

(SECTION IS TAKEN FROM SHEET 5)



HALF SECTION Y-Y

(SECTION IS TAKEN FROM SHEET 5)

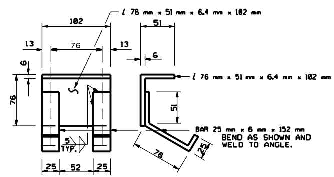
SCHEDULE NO.1

LINE	DIMENSIONS					REINFORCING STEEL				QUANTITIES					
						A-BARS		B-BARS				STRUCTURAL STEEL			
	H	K	W	T	X	LENGTH	NO.	LENGTH	NO.	REINF. STEEL kg.	CONC. CU. M.	PIPES, BARS & ANGLES kg.	COVER PLATE kg.	FRAME* kg.	GATE kg. EA.
1	762	610	762	152	0	965	12	635	12	30.1	0.514	14	39	6	11
2	914	762	↑	↑	152	↑	16	788	↑	39.1	0.599	↑	↑	↑	↑
3	1067	915			305		16	940		42.0	0.684				
4	1219	1067			458		20	1092		50.9	0.768				
5	1372	1219			610		20	1245		53.8	0.853				
6	1524	1372			762		24	1397		62.7	0.938				
7	1676	1524			914		24	1550		65.6	1.023				
8	1829	1677			1067		28	1702		74.5	1.109				
9	1981	1829	↓	↓	1220	↓	28	1854	↓	77.4	1.193	↓	↓	↓	↓
10	2134	1982	762	152	1372	965	32	2007	12	86.3	1.278	14	39	6	11
11	914	762	914	152	0	1118	16	788	12	42.9	0.722	16	54	8	19
12	1067	915	↑	↑	152	↑	16	940	↑	45.8	0.821	↑	↑	↑	↑
13	1219	1067			305		20	1092		55.7	0.920				
14	1372	1220			458		20	1245		58.6	1.019				
15	1524	1372			610		24	1397		68.4	1.119				
16	1676	1524			762		24	1550		71.3	1.217				
17	1829	1677			914		28	1702		81.2	1.317				
18	1981	1829			1067		28	1854		84.1	1.416				
19	2134	1982	↓	↓	1220	↓	32	2007	↓	94.0	1.515	↓	↓	↓	↓
20	2286	2134	914	152	1372	1118	32	2159	12	96.8	1.614	16	54	8	19

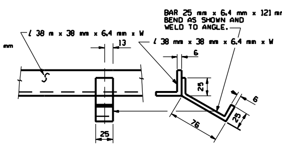
* PLATES A TO D PER GATE

SCHEDULE NO.2

PIPE SIZE	DIMENSIONS AND QUANTITIES									
	COVER PLATE		FRAME AND GATE							
D	a	b	B	S	N	PLATE-A 1 EACH	PLATE-B 1 EACH	PLATE-C 2 EACH	GATE SIZE	PLATE-D 1 EACH
450	787	749	584	610	12	6 x 51 x 584	6 x 51 x 610	6 x 25 x 559	5 x 521 x 559	6 x 64 x 610
600	940	902	737	763	15	6 x 51 x 731	6 x 51 x 762	6 x 25 x 711	5 x 673 x 711	6 x 64 x 762



DETAIL "M"



DETAIL "N"

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.		APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE

APPROVED: DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)

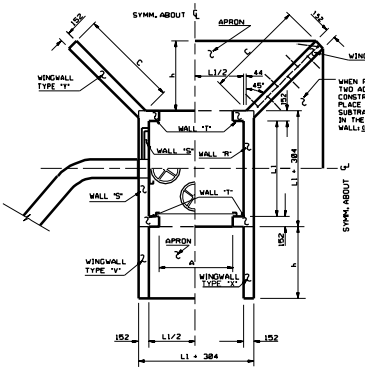
SHT. 6 OF 6

STANDARD DIVERSION BOX THREE GATE BOX SECTIONS FOR 450 mm DIA. OR 600 mm DIA. PIPE

STANDARD DRAWING TITLE

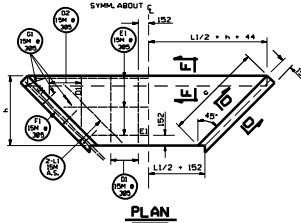
STD. DWG. NO.

1551-6

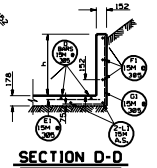


DIVERSION BOX W/INTERCHANGEABLE WALLS

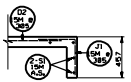
PLAN VIEW



PLAN

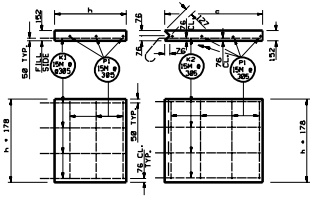


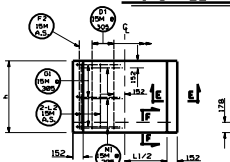
SECTION F-F



APRON & WINGWALLS TYPE "W"

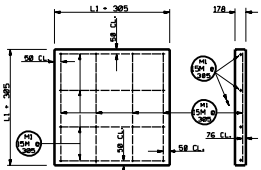
NOTE:
BOTH "S" AND "T" WALLS HAVE THE OPTION OF HAND SLIDING GATE. WHEN SELECTING THIS OPTION THE CONCRETE LISTED IN THE TABLES SHOULD BE MODIFIED BY SUBTRACTING FROM THEM THE BLOCK-OUT AS DETERMINED BY THESE FORMULAS: "T" WALL=0.25h (E-F1/27); "S" WALL=h (L1-2F1+0.125)/27.

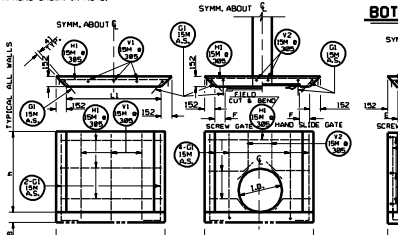




APRON & WINGWALLS TYPE "V"

NOTE:
PROVIDE CUT-OFF WALL ONLY WHEN CALLED FOR IN NOTE. WHEN SO SPECIFIED, IT SHALL BE PROVIDED FOR ALL APRONS SHOWN IN NOTE.

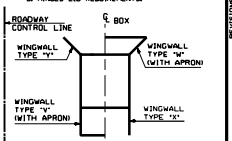




NOTES:

INTERPRETATION OF SCHEMATIC SKETCH ON ROADWAY PLAN AND PROFILE SHEET SHOULD INCLUDE:

1. ORIENTATION OF DIVERSION BOX RELATIVE TO ROADWAY CONTROL LINE.
2. TYPE OF WALL SPECIFIED FOR EACH BOX WITH ACCOMPANYING GATE AND CUT-OFF WALL REQUIREMENTS.
3. HINGED LID REQUIREMENTS.



SCHEMATIC SKETCH

SEE ROADWAY PLAN AND PROFILE SHEET

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			REMARKS
NO.		APPR.	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: MARCH 1993
DATE

CHAIRMAN, STANDARDS COMMITTEE
APPROVED: MAR. 29, 1994
DATE

DEPUTY DIRECTOR

STANDARD DRAWING TITLE

STANDARD DIVERSION BOX W/INTERCHANGEABLE WALLS BOTTOM SLAB, WALLS AND APRON DETAILS

(METRIC) SHT. 1 OF 8

STD. DWG. NO.

1562-1

DIVERSION BOX SIZES ARE BASED ON BOTH THE SCREW GATE FRAME SIZES AND THE DIAMETERS OF ROUND PIPE. THEY MAY BE USED WITH EITHER FLUMES, ARCH PIPES OR ROUND PIPES.

WINGWALLS WITH ATTACHED APRON

PIPE	LINE NUMBER	DIMENSIONS IN mm.	FLUME SIZE A x B: SCREW GATE	FLUME SIZE A x B: HAND SLIDE GATE	C	E	F	h	L1
I.D.	1	300		305x305	762	152	76	533	610
I.D.	2	450	457x457	457x457	965	152	76	686	762
I.D.	3	600	610x610	610x610	1168	152	76	838	914
I.D.	4	750	762x762		1397	203	127	991	1168
I.D.	5	900	914x914		1626	203	127	1143	1321
I.D.	6	1050	1067x1067		1829	203	102	1295	1473
I.D.	7	1200	1219x1219		2057	229	127	1448	1676
S x R	8	914x559	914x610	914x610	1118	203	127	787	1321
S x R	9	1092x686	1219x762		1295	203	102	914	1626
S x R	10	1270x787	1524x914		1448	229	127	1016	1981
S x R	11	1473x914	1524x914		1626	229	127	1143	1981
S x R	12	1651x1016	1829x1065		1753	229	127	1245	2286
S x R	13	1829x1118	1829x1219		1905	229	127	1346	2286

TYPE W

γ = NO. OF SETS; CUT LINE; β = NO. OF BARS PER SET; Ave. L'gth = (α + W)/2; D1,F1,L1,S1; G1 (356); J1 (330)

LINE NUMBER	E1 α	E1 W	E1 γ	E1 β	E1 AVE. LENGHT	D2 α	D2 W	D2 γ	D2 β	D2 AVE. LENGHT	D1 LENGHT	D1 NO.	G1 θ	G1 LENGHT	G1 NO.	F1 LENGHT	F1 NO.	L1 LENGHT	L1 NO.	J1 LENGHT	J1 NO.	S1 LENGHT	S1 NO.	REINFORCING STEEL kg. WITHOUT CUT-OFF WALL	REINFORCING STEEL kg. WITH CUT-OFF WALL	CONCRETE CUBIC METERS WITHOUT CUT-OFF WALL	CONCRETE CUBIC METERS WITH CUT-OFF WALL
1	991	1651	1	2	1321	330	0	2	1	330	787	2	584	940	6	813	4	610	4	660	6	1651	2	25.4	36.8	.277	.462
2	1143	2108		3	1626	483	178		2	330	940	3	737	1092	8	1016	6	838			9	2108		42.7	58.7	.441	.520
3	1295	2565		3	1930	635	330		2	483	1092	3	889	1245	10	1219	6	1041			9	2565		54.8	72.2	.636	.749
4	1575	3150		4	2362	787	178		3	483	1245	4	1041	1397	10	1448	8	1270			12	3150		75.7	98.8	.8945	1.030
5	1702	3581		4	2642	940	330		3	635	1397	4	1194	1549	12	1676	8	1473			12	3581		90.8	114.5	1.174	1.330
6	1880	4064		5	2972	1092	178		4	635	1549	5	1346	1702	14	1880	10	1676			15	4064		120.9	149.2	1.479	1.656
7	2057	4547		5	3302	1245	330		4	787	1702	6	1499	1854	16	2108	10	1905			16	4547		143.5	174.3	1.846	2.044
8	1702	2870		3	2286	584	279		2	457	1041	4	838	1194	10	1168	6	965			10	2870		56.0	75.4	.636	.762
9	2007	3429		3	2718	711	406		2	559	1168	5	965	1321	10	1346	6	1143			11	3429		66.1	88.2	.859	1.008
10	2362	3988		4	3175	813	203		3	508	1270	7	1067	1422	12	1499	8	1295			15	3988		92.4	120.5	1.083	1.258
11	2362	4242		4	3302	940	330		3	635	1397	7	1194	1549	12	1676	8	1473			15	4242		101.6	130.4	1.307	1.492
12	2667	4750		5	3708	1041	127		4	584	1499	8	1295	1651	14	1803	10	1626			18	4750		130.1	163.6	1.560	1.767
13	2667	4953	1	5	3810	1143	229	2	4	686	1600	8	1397	1753	14	1956	10	1753	4		18	4953	2	130.9	173.1	1.775	1.990

TYPE V

G1 (356); L2,D1,M1,F2,S1; J1 (330)

G1 θ	G1 LENGHT	G1 NO.	L2 LENGHT	L2 NO.	D1 LENGHT	D1 NO.	M1 LENGHT	M1 NO.	F2 LENGHT	F2 NO.	J1 LENGHT	J1 NO.	S1 LENGHT	S1 NO.	REINFORCING STEEL kg. WITHOUT CUT-OFF WALL	REINFORCING STEEL kg. WITH WALL	CONCRETE CUBIC METERS WITHOUT CUT-OFF WALL	CONCRETE CUBIC METERS WITH CUT-OFF WALL	LINE NUMBER
584	940	6	432	4	787	2	813	3	787	4	660	4	813	2	22.0	29.5	.174	.213	1
737	1092	6	584		940	3	965	3	940	6		5	965		31.8	40.0	.274	.319	2
889	1245	8	737		1092	3	1118	4	1092	6		5	1118		42.7	51.4	.396	.448	3
1041	1397	8	889		1245	4	1372	4	1245	8		6	1372		55.2	65.7	.559	.622	4
1194	1549	10	1041		1397	4	1524	5	1397	8		6	1524		69.1	80.1	.729	.798	5
1346	1702	10	1194		1549	5	1676	5	1549	10		7	1676		83.9	96.4	.921	.997	6
1499	1854	12	1346		1702	6	1880	6	1702	12		8	1880		109.2	123.4	1.149	1.233	7
838	1194	6	686		1041	4	1524	3	1041	6		6	1524		39.1	50.1	.417	.486	8
965	1321	8	813		1168	5	1829	4	1168	8		7	1829		57.0	70.0	.569	.653	9
1041	1422	8	914		1270	7	2184	4	1270	8		9	2184		67.2	83.4	.728	.825	10
1194	1549	10	1041		1397	7	2184	5	1397	8		9	2184		80.9	97.1	.862	.968	11
1295	1651	10	1143		1499	8	2489	5	1499	10		10	2489		95.0	113.2	1.045	1.155	12
	1753	10	1245	4	1600	8	2489	5	1600	10	660	10	2489	2	100.1	118.3	1.173	1.283	13

DIVERSION BOX SIZES ARE BASED ON BOTH THE SCREW GATE FRAME SIZES AND THE DIAMETERS OF ROUND PIPE. THEY MAY BE USED WITH EITHER FLUMES, ARCH PIPES OR ROUND PIPES.

WINGWALLS WITHOUT ATTACHED APRON

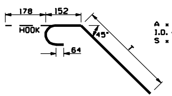
PIPE	LINE NUMBER	DIMENSIONS IN mm.	FLUME SIZE A x B: SCREW GATE	FLUME SIZE A x B: HAND SLIDE GATE	C	E	F	h	L1
I.D.	1	300		305x305	762	152	76	584	610
I.D.	2	450	457x457	457x457	965	152	76	686	762
I.D.	3	600	610x610	610x610	1168	152	76	838	914
I.D.	4	750	762x762		1397	203	127	991	1168
I.D.	5	900	914x914		1626	203	127	1143	1321
I.D.	6	1050	1067x1067		1829	203	102	1295	1473
I.D.	7	1200	1219x1219		2057	229	127	1448	1676
S x R	8	914x559	914x610	914x610	1118	203	127	787	1321
S x R	9	1092x686	1219x762		1295	203	102	914	1626
S x R	10	1270x787	1524x914		1448	229	127	1016	1981
S x R	11	1473x914	1524x914		1626	229	127	1143	1981
S x R	12	1651x1016	1829x1065		1753	229	127	1245	2286
S x R	13	1829x1118	1829x1219		1905	229	127	1346	2286

LINE NUMBER	WINGWALL X: K1 LENGHT	K1 NO.	P1 LENGHT	P1 NO.	REINFORCING STEEL kg.	CONCRETE CUBIC METERS	WINGWALL Y: K2 T	K2 LENGHT	K2 NO.	P1 LENGHT	P1 NO.	REINFORCING STEEL kg.	CONCRETE CUBIC METERS
1	787	3	584	3	6.5	0.058	838	1168	3	610	3	8.4	0.079
2	940	3	737	3	7.9	0.090	1041	1372	3	737	4	11.1	0.122
3	1092	4	889	4	12.4	0.130	1245	1575	4	889	4	15.5	0.175
4	1245	4	1041	4	14.4	0.177	1473	1803	4	1041	5	19.5	0.242
5	1397	5	1194	5	20.3	0.230	1702	2032	5	1194	6	27.2	0.320
6	1549	5	1346	5	22.7	0.291	1905	2235	5	1346	6	30.2	0.402
7	1702	6	1499	6	30.2	0.359	2134	2464	6	1499	7	39.7	0.500
8	1041	3	838	3	8.9	0.116	1194	1524	3	838	4	12.4	0.159
9	1168	4	965	4	13.4	0.152	1372	1702	4	965	5	18.3	0.209
10	1270	4	1067	4	14.7	0.185	1524	1854	4	1041	5	19.8	0.257
11	1397	5	1194	5	20.3	0.230	1702	2032	5	1194	6	27.2	0.320
12	1499	5	1295	5	21.9	0.270	1829	2159	5	1295	6	29.1	0.372
13	1600	5	1397	5	23.5	0.313	1981	2311	5	1397	7	33.5	0.434

WALL TYPES

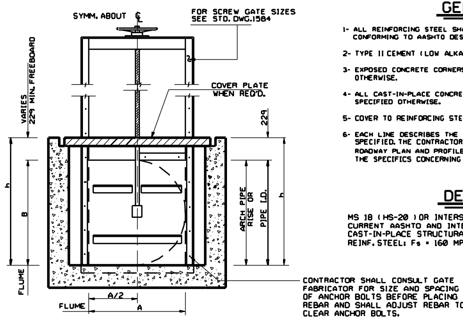
LINE NUMBER	WALL R: G1 θ	G1 LENGHT	G1 NO.	H1 l	H1 LENGHT	H1 NO.	V1 LENGHT	V1 NO.	REINFORCING STEEL kg.	CONCRETE CUBIC METERS	WALL S: G1 θ	G1 LENGHT	G1 NO.	H1 l	H1 LENGHT	H1 NO.	V2 LENGHT	V2 NO.	REINFORCING STEEL kg.	CONCRETE CUBIC METERS
1	584	940	2	813	1321	2	584	2	8.9	0.062	584	940	4	813	1321	2	432	1	10.7	0.051
2	737	1092		965	1473	3	737	2	12.7	0.096	737	1092		965	1473	3	508	1	14.6	0.070
3	889	1245		1118	1626	3	889	3	15.8	0.137	889	1245		1118	1626	3	584	1	16.4	0.092
4	1049	1397		1372	1880	4	1049	4	22.8	0.200	1049	1397		1372	1880	4	660	2	22.7	0.130
5	1194	1549		1524	2032	4	1194	4	25.1	0.258	1194	1549		1524	2032	4	737	3	26.0	0.157
6	1346	1702		1676	2184	5	1346	5	33.1	0.323	1346	1702		1676	2184	5	813	3	31.7	0.185
7	1499	1854		1880	2388	5	1499	5	36.3	0.405	1499	1854		1880	2388	5	889	4	36.0	0.226
8	838	1194		1524	2032	3	838	4	18.6	0.177	838	1194		1524	2032	3	559	3	19.7	0.115
9	965	1321		1829	2337	3	965	5	22.7	0.249	965	1321		2083	2337	3	635	5	24.3	0.158
10	1067	1422		2184	2692	4	1067	6	31.4	0.332	1067	1422		2184	2692	4	711	5	31.4	0.207
11	1194	1549		2184	2692	4	1194	6	33.0	0.373	1194	1549		2184	2692	4	737	5	32.4	0.218
12	1295	1651		2489	2997	4	1295	7	38.2	0.465	1295	1651		2489	2997	4	787	6	36.6	0.260
13	1397	1753	2	2489	2997	5	1397	7	44.4	0.502	1397	1753	4	2489	2997	5	838	6	42.4	0.251

LINE NUMBER	WALL T: G1 θ	G1 LENGHT	G1 NO.	H2 θ	H2 LENGHT	H2 NO.	REINFORCING STEEL kg.	CONCRETE CUBIC METERS	BOTTOM SLAB: M1 LENGHT	M1 NO.	REINFORCING STEEL kg.	CONCRETE CUBIC METERS
1	584	940	4	254	508	4	9.1	0.037	813	8	10.2	0.140
2	737	1092				6	11.6	0.048	965	8	12.1	0.203
3	889	1245				6	12.6	0.058	1118	10	17.6	0.265
4	1041	1397				8	15.2	0.084	1372	12	25.0	0.386
5	1194	1549				8	16.1	0.097	1524	12	28.7	0.469
6	1346	1702				10	18.7	0.110	1676	14	36.8	0.562
7	1499	1854				10	19.6	0.135	1880	14	41.3	0.698
8	838	1194				6	12.3	0.067	1524	12	28.7	0.469
9	965	1321				6	13.1	0.078	1829	16	45.9	0.663
10	1041	1422				8	15.3	0.095	2184	16	54.9	0.929
11	1194	1549				8	16.1	0.106	2184	16	54.9	0.929
12	1295	1651				8	16.7	0.115	2489	18	70.3	1.194
13	1397	1753	4	254	508	10	19.0	0.125	2489	18	70.3	1.194



A x B - FLUME SIZE OR GATE SIZE
I.D. - INSIDE DIAMETER OF ROUND PIPE
S x R - SPAN x RISE OF ARCH PIPE

180° STANDARD HOOK DETAIL



SCREW GATE INSTALLATION DIAGRAM

NOTES:

1. FOR TRANSITION STRUCTURE FROM DIVERSION BOX TO TRAPEZOIDAL SHAPED CHANNEL WITH BOTTOM WIDTH OF 305 mm, SEE STD.DWG. 1562A
2. ALL DIMENSIONS ARE ROUNDED TO THE NEAREST WHOLE mm. THOSE DIMENSIONS SHOWN FOR REBAR ARE OUT-TO-OUT OF BAR.
3. WHEN LAYING-OUT SET REBAR, USE "α" AND "W" DIMENSIONS, NOT AVERAGE LENGTH OF REBAR.
4. USE STANDARD 180° HOOK FOR K2 BAR AS NOTED.
5. 15M REBARS SHALL BE USED FOR ALL MARK NUMBERS.
6. SAME SIZE BOX IS REQUIRED FOR BOTH METAL PIPE AND CONCRETE PIPE.

GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED, DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO DESIGNATION M 284M OR M 111 AND M 31M GRADE 400.

2- TYPE II CEMENT (LOW ALKALI) SHALL BE USED UNLESS SPECIFIED OTHERWISE.

3- EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 19 mm EXCEPT WHERE NOTED OTHERWISE.

4- ALL CAST-IN-PLACE CONCRETE SHALL BE CONCRETE CLASS AA(AE) EXCEPT WHERE SPECIFIED OTHERWISE.

5- COVER TO REINFORCING STEEL SHALL BE 50 mm EXCEPT WHERE NOTED OTHERWISE.

6- EACH LINE DESCRIBES THE QUANTITIES FOR ONE WALL OR SLAB OF THE TYPE SPECIFIED. THE CONTRACTOR SHALL USE THIS DRAWING IN CONJUNCTION WITH ROADWAY PLAN AND PROFILE, AND ROADWAY SUMMARY SCHEDULES TO DETERMINE THE SPECIFICS CONCERNING EACH DIVERSION BOX.

DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.
CAST-IN-PLACE STRUCTURAL CONCRETE: Fc = 10 MPa, N = 8
REINF. STEEL: Fs = 160 MPa

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

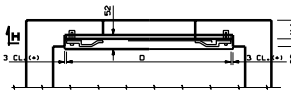
NO.	DATE	APPR.	REMARKS

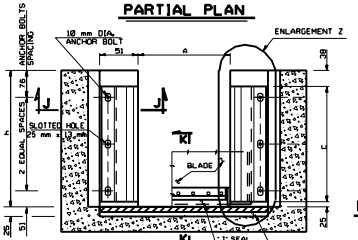
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

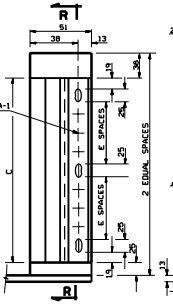
RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR.09,1999 DATE
DEPUTY DIRECTOR

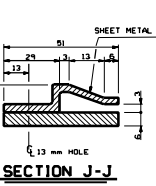
(METRIC)
SHT. 2 OF 8
STANDARD DIVERSION BOX W/INTERCHANGEABLE WALLS QUANTITIES SCHEDULE
STANDARD DRAWING TITLE

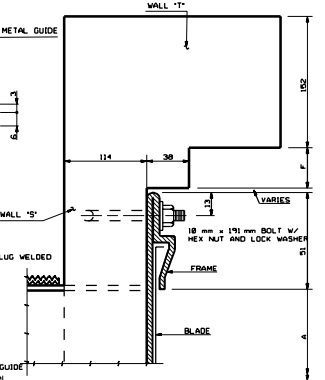
STD. DWG. NO.
1562-2

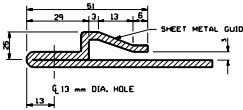










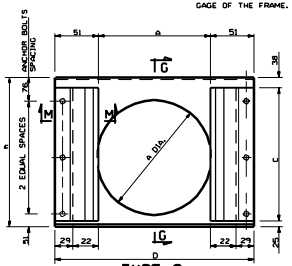


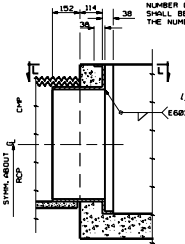
NOTE:
FRAME SHALL BE WELDED WATER-TIGHT TO THE END OF THE METAL PIPE. GAGE OF METAL PIPE IS THE SAME AS THE GAGE OF THE FRAME.

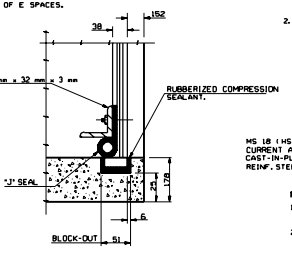
NOTE:
NUMBER OF SLOT WELDS SHALL BE ONE LESS THAN THE NUMBER OF E SPACES.

NOTE:
SHEET METAL GUIDE SHALL BE PLUG WELDED TO FRAME. USE E6011 ELECTRODE.

NOTE:
1. SHEET METAL FRAME SHALL BE INSTALLED PERPENDICULAR TO THE FLOOR OF THE BOX PRIOR TO CASTING THE WALLS. WHEN THE CONTRACTOR COMPACTS THE CONCRETE SURROUNDING THE FRAME, HE SHALL BE CAREFUL NOT TO SCAR OR OTHERWISE DAMAGE THE FRAME SURFACE BETWEEN THE BLADE AND THE FRONT FACE OF THE FRAME SO AS NOT TO RENDER THE SEAL BROKEN AND NOT WATER-TIGHT WHEN CLOSED.
2. THE BLADE AND FRAME SHALL BE FABRICATED OF ZINC COATED STEEL AND SHALL CONFORM TO AASHTO M 218.







DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.
CAST-IN-PLACE STRUCTURAL CONCRETE: F_c = 18 MPa, N = 8
REINF. STEEL: F_s = 168 MPa

NOTE:
1. ALL BOLTS SHALL BE A 307 BOLTS UNLESS OTHERWISE INDICATED.
2. GALVANIZED FASTENERS SHALL CONFORM TO ASTM STANDARDS A 307 AND A 164.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

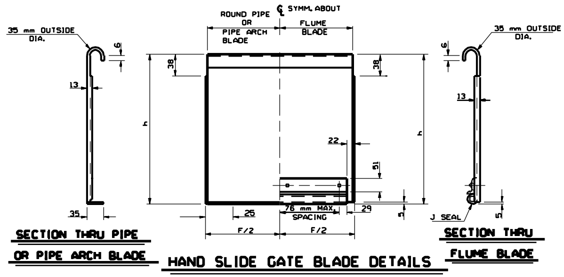
REVISIONS			REMARKS

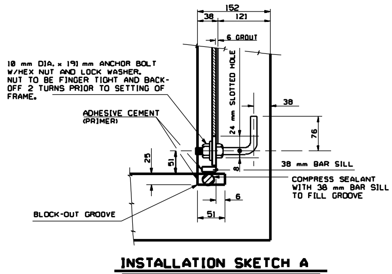
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MARCH 1999 — DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED — MARCH 1999 — DATE
DEPUTY DIRECTOR

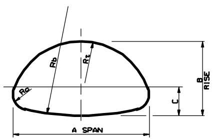
STANDARD DRAWING TITLE
STANDARD DIVERSION BOX W/INTERCHANGEABLE WALLS HAND SLIDE GATE DETAILS
(METRIC)
SHT. 3 OF 8

STD. DWG. NO.
1562-3



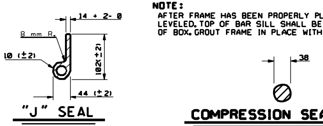


NOTE:
AFTER FRAME HAS BEEN PROPERLY PLUMBED AND LEVELED, TOP OF BAR SILL SHALL BE FLUSH WITH FLOOR OF BOX. GROUT FRAME IN PLACE WITH A CEMENT GROUT.



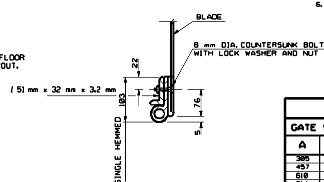
PIPE-ARCH DIMENSIONS					
SPAN	RISE	LAYOUT DIMENSIONS			
		C	Rc	Rt	Rb
914	559	159	127	464	1861

NOTE: PIPE-ARCH LAYOUT IN SHEET METAL FRAME SHALL CONFORM TO THESE DIMENSIONS.



FLEXIBLE JOINT SEALANT

TYP. CROSS-SECTION



PART SECT. THRU FLUME BLADE

GENERAL NOTES

1. ALL BAR AND ANGLE STEEL SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 AND SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M-111M.

2. GUIDES, BLADES, AND SHEET METAL FRAMES OF HAND SLIDE GATES SHALL BE FABRICATED OF ZINC COATED STEEL CONFORMING TO THE REQUIREMENTS OF SPECIFICATION ASTM A 653M..

3. "J" SEALS SHALL BE MOLDED OR EXTRUDED NEOPRENE OR EPDM (ETHYLENE PROPYLENE) OF PROPER LENGTH, CURED TO ENSURE A DENSE HOMOGENEOUS CROSS SECTION FREE FROM PITTING, BLISTERS OR POROSITY, MEETING THE FOLLOWING SPECIFICATIONS WHEN TESTED IN ACCORDANCE WITH APPLICABLE PROVISIONS OF ASTM D 412M, D 471M, D 2240M AND D 395M.

   SHORE A DUROMETER HARDNESS------------------------60 5

	NEOPRENE	EPDM
MINIMUM ELONGATION	450%	35%
ULTIMATE TENSILE STRENGTH	17237 (kPa)	13790 (kPa)
COMPRESSION SET (MAX.)	30%	25%

   BOTH MATERIALS
   ABSORPTION (2 DAYS)---------------------5% BY WEIGHT
   TENSILE STRENGTH (48 HOURS IN OXYGEN 8% OF BEGINNING STRENGTH @ 70°C AND 2068 kPa PRESSURE.)
   ACCURATELY LOCATE AND DRILL ALL HOLES IN SEAL WITH 3 mm OVERSIZE HOLLOW-CORE DRILL.

4. COMPRESSION SEALANT, 38 mm, SHALL BE A TOP GRADE BUTYL RUBBER OF DENSE, HIGHLY COMPRESSIBLE, STABLE MATERIAL WITH GOOD SAG AND ADHESION PROPERTIES PRODUCED FROM BLENDS OF REFINED HYDROCARBON RESINS AND PLASTICIZING COMPOUNDS, REINFORCED WITH INERT MINERAL FILLERS CONTAINING NO SOLVENTS, IRRITATING FUMES OR OBNOXIOUS ODORS NOT DEPENDENT ON OXIDIZING, EVAPORATING OR CHEMICAL ACTION FOR ADHESIVE OR COHESIVE STRENGTH HAVING THE FOLLOWING PROPERTIES:

CHEMICAL COMPOSITION COMPONENTS	MIN.	MAX.	ASTM SPEC.
BITUMEN (HYDROCARBON PLASTIC CONTAIN) % BY WT.	50	70	D4, D140
INERT MINERAL FILLER % BY WT.	30	50	D545
VOLATILE MATTER % BY WT.		2.0	D6

PHYSICAL PROPERTIES	REQUIRED	
SPECIFIC GRAVITY @ 25°C	1.20 TO 1.35	D7
DUCTILITY @ 25°C MIN.	50 mm	D113
SOFTENING POINT @ 25°C MIN.	104°C	D36
FLASH POINT c.o.c. MIN.	194°C	D92
FIRE POINT c.o.c. MIN.	203°C	D92
PENETRATION 25°C 150 gs. 5 sec	50 to 120	D217

   TESTS:
   IF ONE OR MORE TEST SPECIMENS FAIL TO MEET ASTM REQUIREMENTS THE LOT REPRESENTING THAT SPECIMEN SHALL BE REJECTED.

5. BOTH FRAMES CAN BE USED WITH TYPE "G" HAND SLIDE GATES. SPECIFY WHETHER TYPE Ga OR Gb FRAME IS REQUIRED. SEE SHEET 3 FOR FRAME TYPES. NORMALLY THE NUMBER OF GATES WILL EQUAL THE NUMBER OF OPENINGS LESS ONE.

6. THE RUBBER SEAL FOR FLUSH BOTTOM CLOSURE SHALL CONFORM TO ASTM D 2000.

DIMENSION SCHEDULE

GATE SIZE		FLUME							PIPE OR PIPE ARCH					
		FRAME		GUIDE			BLADE		SHEET METAL FRAME				BLADE	
A	B	D	h	C	GAGE	E	F	GAGE	A	h	D	GAGE	F	GAGE
305	305	413	533	470	16	2	343	16	305	533	413	16	343	16
457	457	565	686	622	14	3	495	14	457	686	565	14	495	14
610	610	718	838	768	10	4	648	10	610	838	718	10	648	10
914	610	1048	787	724	10	4	953	8	914	787	1048	10	953	8

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.		APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

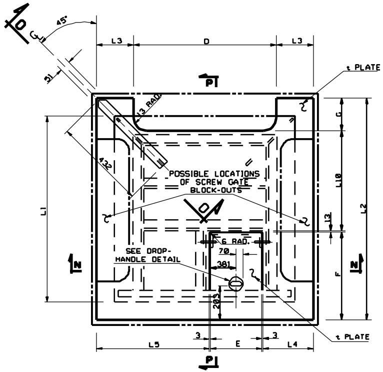
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 4 OF 8
STANDARD DIVERSION BOX
TYPE "G"
HAND SLIDE GATE DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
1562-4

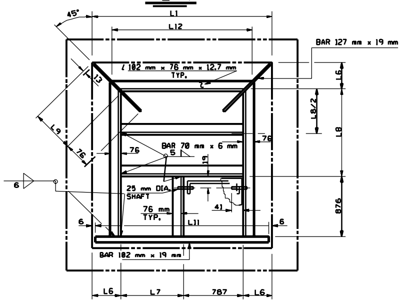
SOLID COVER TYPE "A" SUB-FRAME TYPE "I" DIMENSIONS

LINE NO.	SCREW GATE		WALL SIZE	BLOCK-OUT		HINGED LID			COVER PLATE					SUB-FRAME TYPE I						
	A	B	L1	D	G	E	F	t	L2	t	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12
1	914	914	1321	1048	216	762	1032	6	1600	6	276	305	527	165	203	248	233	340	1308	991
2	1067	1067	1473	1232	241	↑	↑	6	1753	6	260	330	654	191	305	375	270	467	1461	1092
3	1219	1219	1676	1410	241			6	1956	6	273	330	857	191	508	578	270	670	1664	1295
4	914	610	1321	1048	216			6	1600	6	276	305	527	165	203	248	233	340	1308	991
5	1219	762	1626	1378	241			6	1905	6	264	330	806	191	457	527	270	619	1613	1245
6	1524	914	1981	1708	241			10	2261	10	276	330	1162	191	813	883	270	975	1969	1600
7	1829	1067	2286	2013	241	↓	↓	10	2565	10	276	330	1467	191	1118	1187	270	1280	2273	1905
8	1829	1219	2286	2013	241	762	1032	10	2565	10	276	330	1467	191	1118	1187	270	1280	2273	1905



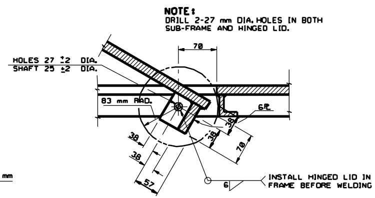
SOLID COVER TYPE "A" DETAILS

PLAN

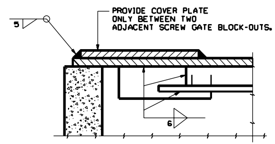


SOLID COVER TYPE "A" DETAILS

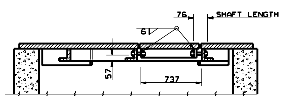
SUB-FRAME TYPE "I" PLAN



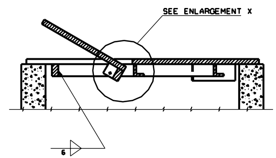
ENLARGEMENT X



SECTION O-O



SECTION N-N



SECTION P-P

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | APPR. | DATE | NO.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — MAR.09,1999 DATE

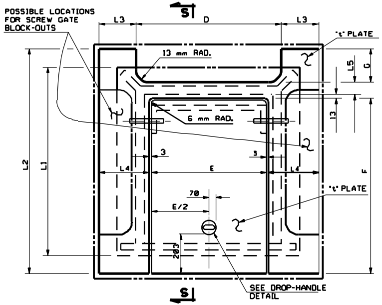
DEPUTY DIRECTOR

(METRIC)
SHT. 5 OF 8

STANDARD DIVERSION BOX HINGED LID (SOLID COVER PLATE) TYPE "A" DETAILS TYPE I PLAN

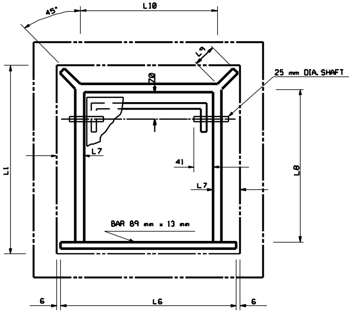
STANDARD DRAWING TITLE

STD. DWG. NO.
1562-5



SOLID COVER TYPE "A" DETAILS

PLAN

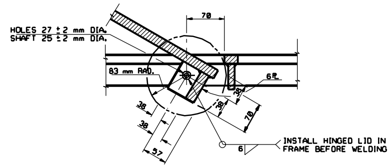


SOLID COVER TYPE "A" DETAILS

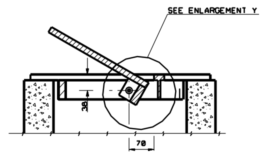
SUB-FRAME TYPE II PLAN

SOLID COVER TYPE "A" SUB-FRAME TYPE II DIMENSIONS																			
LINE NO.	SCREW GATE		WALL SIZE	BLOCK-OUT		HINGED LID			COVER PLATE					SUB-FRAME TYPE II					
	A	B	L1	D	G	E	F	t	L2	t	L3	L4	L5	L6	L7	L8	L9	L10
1	457	457	762	565	216	514	775	6	1041	6	238	260	38	749	121	662	108	597
2	610	610	914	718	216	667	927	6	1194	6	238	260	38	902	121	768	114	740
3	762	762	1168	895	216	762	1181	6	1448	6	276	340	38	1156	200	1022	114	994

NOTE:
DRILL 2-27 mm DIA. HOLES IN BOTH SUB-FRAME AND HINGED LID.



ENLARGEMENT Y



SECTION S-S

NOTE:
ALL MEMBERS OF SUB-FRAME TYPE II SHALL BE BAR 89 mm x 13 mm DIA. EXCEPT AS NOTED.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

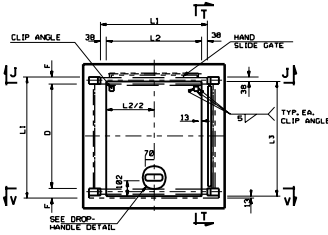
REVISIONS | REMARKS | NO. | APPR.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

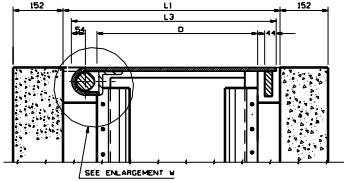
RECOMMENDED FOR APPROVAL — MAR. 09, 1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR. 09, 1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 6 OF 8
STANDARD DIVERSION BOX HINGED LID (SOLID COVER PLATE) TYPE "A" DETAILS TYPE II PLAN
STANDARD DRAWING TITLE

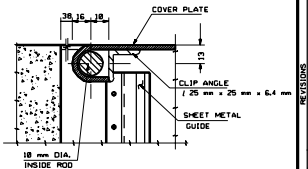
STD. DWG. NO.
1562-6



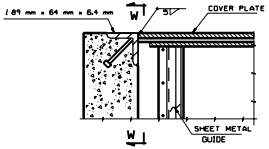
PLAN



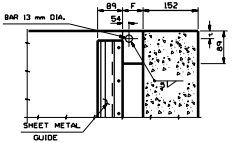
SECTION T-T



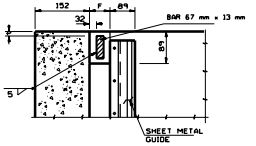
ENLARGEMENT W



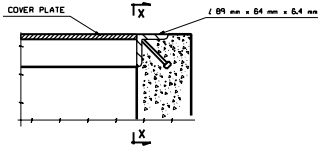
SECTION J-J



SECTION W-W



SECTION X-X



SECTION V-V

NOTE:
13 X 105 M4-L NELSON CONCRETE ANCHOR SHALL BE AUTOMATICALLY END WELDED TO THE FILLET OF THE ANGLE. CENTER ANCHOR ABOUT FILLET.

SOLID COVER TYPE "B" DETAILS

GENERAL NOTES

1. PREFORMED JOINT MATERIAL SHALL BE AASHTO DESIGNATION M 213
2. ALL STRUCTURAL STEEL SHALL BE EITHER STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 OR A RAISED PATTERN CARBON STEEL U.S. STEEL S 300 OR SHALL BE USED IN SIDEWALK LOCATIONS ONLY.
3. HINGED LID SOLID COVERS SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111 (ASTM A 123M).
4. WHEN HINGED LID IS PLACED IN SIDEWALK LOCATIONS, A CLASS 2 RUBBED FINISH SHALL BE PROVIDED FOR ALL BEARING SURFACES AT TOP OF WALL. AT THE DISCRETION OF THE PROJECT ENGINEER, THE COVER PLATE MAY BE RECESSED THE THICKNESS OF THE COVER PLATE AND ALL BEARING SURFACES GROUTED WITH A CEMENT GROUT TO LEVEL THE HINGED LID.
5. THIS DRAWING SHOULD NOT BE USED IN ROADWAY APPLICATIONS WHERE THE HINGED LID WILL BE SUBJECTED TO A WHEEL LOAD.

DESIGN DATA

THE DESIGN IS IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.
LOADING = COVER PLATES ARE DESIGNED FOR A LOAD OF 2411 Kg/m²
STRUCTURAL STEEL: Fs = 138 MPa.

SOLID COVER TYPE "B" DIMENSIONS

LINE NO.	HAND SLIDE GATE A	HAND SLIDE GATE B	WALL SIZE L1	COVER PLATE D	COVER PLATE F	COVER PLATE L2	COVER PLATE L3	COVER PLATE t
1	305	305	610	413	76	533	559	6
2	457	457	762	565	76	686	711	6
3	610	610	914	718	76	838	864	6
4	914	610	1321	1048	127	1245	1278	6

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | BY | APPD | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

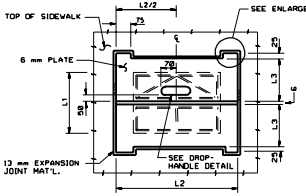
RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — DATE: MARCH 1999
APPROVED
DEPUTY DIRECTOR — DATE: MARCH 1999

(METRIC)
SHT. 7 OF 8

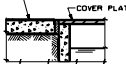
STANDARD DIVERSION BOX
HINGED LID SOLID COVER
TYPE "B" DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
1562-7

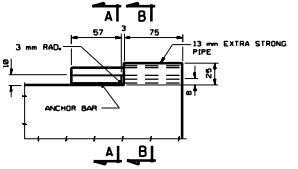


PLAN

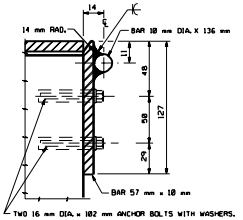


PARTIAL SECTION

NOTE :
PAINT THIS SIGN ON COVER PLATE AFTER FABRICATION.
*RAISE COVER PLATE TO CHANGE GATES' LETTERS SHALL BE 50 mm IN HEIGHT.

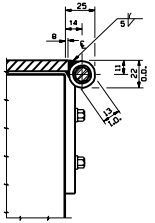


ENLARGEMENT K

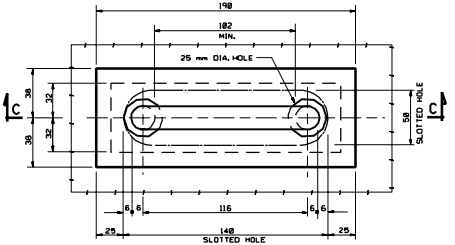


SECTION A-A

SOLID COVER TYPE "C" DETAILS

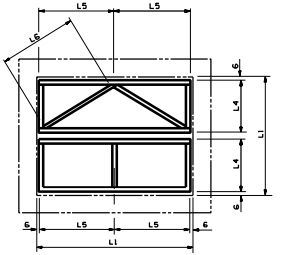


SECTION B-B

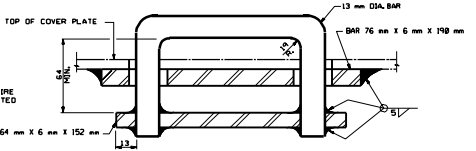


PLAN

SOLID COVER TYPE "C" SUB-FRAME TYPE III DIMEN.										
LINE NO.	HAND SLOT DATE		WALL SIZE	COVER PLATE			SUB-FRAME TYPE III			
	A	B	L1	L2	L3	t	L4	L5	L6	BAR SIZE
1	305	305	610	914	454	6	—	—	—	—
2	457	457	762	1067	530	6	—	—	—	—
3	610	610	914	1219	686	5	425	451	584	89 mm x 13 mm
4	914	610	1320	1320	657	5	624	654	870	89 mm x 13 mm



SUB-FRAME TYPE III



SECTION C-C

DROP HANDLE DETAIL

NOTE:
EACH DIVERSION BOX COVER SHALL REQUIRE EITHER ONE DROP-DOWN HANDLE IF LOCATED IN SIDEWALK OR A SLOTTED HAND HOLE 50 mm X 140 mm.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | BY | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — MARCH 31, 1993 DATE
APPROVED
DEPUTY DIRECTOR — MARCH 31, 1993 DATE

(METRIC)
SHT. 8 OF 8

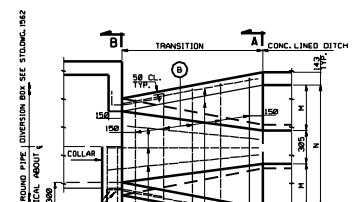
STANDARD DIVERSION BOX
HINGED LID
SOLID COVER
TYPE "B" & "C" DETAILS

STANDARD DRAWING TITLE

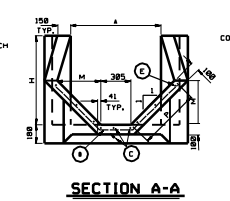
STD. DWG. NO.
1562-8

SCHEDULE

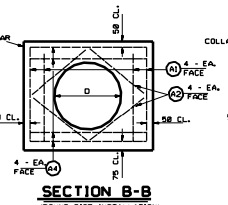
LINE	PIPE DIA. D	PIPE ARCH S	PIPE ARCH R	DIVERSION BOX H	DIVERSION BOX A	DIMENSIONS H	T	M	N	P	TRANSITION ONE EACH B1 a	b	θ	LENGTH	B2 a	b	θ	LENGTH	B3 a	b	θ	LENGTH	B4 a	b	θ	LENGTH	B5 a	b	θ	LENGTH	B6 a	b	θ	LENGTH	B7 a	b	θ	LENGTH	C NO.BARS	A	NO.BARS	COLLAR A1 LENGTH	NO.BARS	A2 LENGTH	NO.BARS	A3 LENGTH	NO.BARS	A4 LENGTH	NO.BARS	LINE
1	305	--	--	533	305	533	1219	283	711	289	457	483	93°	1422	432	486	181°	1245	381	356	111°	1092	356	305	126°	965	--	--	--	--	--	--	--	--	--	--	--	--	1346	1	1168	1778	4	610	8	686	8	--	--	813	1	1
2	457	--	--	686	457	686	1219	385	914	432	584	635	94°	1854	533	559	182°	1651	457	483	114°	1422	381	457	128°	1295	--	--	--	--	--	--	--	--	--	--	--	--	1346	2	1168	1778	4	762	8	864	8	--	--	965	1	2
3	610	--	--	838	610	838	1219	457	1219	648	737	787	94°	2311	610	711	184°	2032	508	660	115°	1829	486	635	128°	1676	--	--	--	--	--	--	--	--	--	--	--	--	1346	2	1168	1778	6	914	8	762	8	--	--	1118	1	3
4	762	--	--	991	762	991	1524	550	1422	791	864	940	93°	2743	737	864	181°	2464	635	813	118°	2261	483	787	128°	2057	486	787	130°	1981	--	--	--	--	--	--	--	--	1651	3	1473	2083	6	1067	8	813	--	--	--	1270	4	4
5	914	--	--	1143	914	1143	1829	686	1676	968	1016	1092	93°	3200	889	1016	180°	2921	787	965	107°	2718	660	965	115°	2578	533	940	122°	2413	486	965	131°	2337	--	--	--	--	--	1956	3	1778	2388	6	1219	864	--	--	--	--	1422	--	5
6	1067	--	--	1295	1067	1295	2134	813	1938	1149	1168	1278	93°	3708	1041	1194	98°	3429	914	1168	105°	3251	813	1118	111°	3048	660	1118	118°	2896	533	1118	125°	2769	485	1118	132°	2642	2261	4	2083	2692	8	1372	965	--	--	--	--	1575	--	6
7	1219	--	--	1448	1219	1448	2134	915	2235	1305	1321	1422	93°	4166	1168	1346	99°	3861	1016	1321	105°	3658	864	1295	111°	3454	711	1295	118°	3302	559	1295	125°	3150	486	1321	132°	3048	2261	4	2083	2692	8	1524	1041	0	--	--	--	1727	--	7
8	--	914	559	787	914	787	1219	500	1321	718	991	737	95°	2464	813	711	186°	2235	635	686	117°	2007	432	711	129°	1854	--	--	--	--	--	--	--	--	--	--	--	--	1346	3	1168	1778	4	864	4	686	4	1422	8	8
9	--	1042	686	914	1042	914	1219	660	1626	933	1143	889	95°	2921	914	838	187°	2691	686	864	119°	2413	457	889	138°	2235	--	--	--	--	--	--	--	--	--	--	--	--	1346	4	1168	1778	4	991	4	965	4	737	4	1688	9
10	--	1270	787	1016	1270	1016	1524	762	1829	1076	1321	991	94°	3302	1118	965	184°	3048	889	965	113°	2819	686	991	123°	2667	457	1041	136°	2540	--	--	--	--	--	--	--	--	1651	5	1473	2083	6	1092	4	1041	4	737	4	1778	10
11	--	1473	914	1143	1473	1143	1829	914	2134	1245	1549	1118	94°	3785	1321	1118	182°	3556	1092	1118	118°	3327	889	1143	118°	3175	686	1194	129°	3073	457	1245	132°	2946	--	--	--	--	1956	5	1778	2388	8	1219	1067	787	1981	11
12	--	1651	1016	1245	1651	1245	1829	1016	2337	1426	1752	1219	94°	4140	1448	1194	182°	3835	1194	1219	118°	3632	965	1245	118°	3454	711	1321	129°	3353	483	1397	132°	3277	--	--	--	--	1956	6	1778	2388	8	1321	1219	841	2159	12
13	--	1829	1118	1346	1829	1346	2134	1143	2591	1616	1880	1321	93°	4521	1651	1321	180°	4293	1422	1321	117°	4064	1168	1346	113°	3861	940	1397	119°	3734	711	1448	125°	3607	457	1524	131°	3505	2261	6	2083	2692	12	1422	8	1219	4	914	4	2337	13



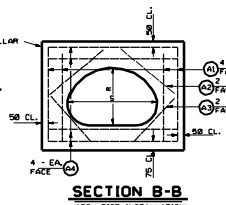
PLAN



SECTION A-A
(DIVERSION BOX INSTALLATION)



SECTION B-B
(ROUND PIPE INSTALLATION)



SECTION B-B
(ARCH PIPE INSTALLATION)

DESIGN DATA

THE DESIGN IS IN ACCORDANCE WITH CURRENT AASHTO SPECIFICATIONS AND INTERIM SPECIFICATIONS:

Fc = 10 MPa
Fs = 160 MPa
N = 8

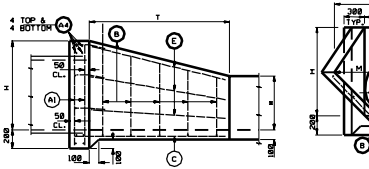
GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO DESIGNATION M 284M OR M 111 AND M 31M, GRADE 400.

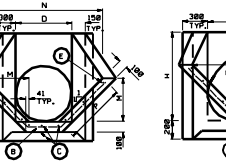
2- TYPE II CEMENT (LOW ALKALI) REQUIRED.

3- CONCRETE DISPLACED BY PIPE SHALL BE DEDUCTED FROM THOSE CONCRETE QUANTITIES GIVEN IN SCHEDULE.

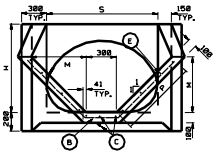
4- IF PIPE SIZES OTHER THAN SHOWN ARE USED OR IF PIPES ARE SKEWED, CONCRETE QUANTITIES SHALL BE ADJUSTED ACCORDINGLY.



ELEVATION
(PIPE INSTALLATION)



SECTION A-A
(ROUND PIPE INSTALLATION)



SECTION A-A
(ARCH PIPE INSTALLATION)

QUANTITIES

LINE	REINF. STEEL TRANSITION kg	REINF. STEEL COLLAR kg	CONCRETE TRANSITION m³	CONCRETE COLLAR m³
1	28.7	23.8	0.200	0.154
2	25.2	28.7	0.256	0.217
3	33.3	35.1	0.323	0.298
4	45.5	39.6	0.472	0.374
5	54.0	44.8	0.557	0.469
6	82.1	49.1	0.871	0.574
7	95.1	53.9	0.985	0.698
8	38.4	38.8	0.344	0.349
9	35.6	43.2	0.487	0.435
10	55.2	47.2	0.568	0.524
11	76.5	51.8	0.778	0.641
12	92.9	57.6	0.844	0.748
13	186.9	68.6	1.881	0.864

NOTE:
ALL REINFORCING STEEL SHALL BE 15M AND SPACED EQUALLY.

QUANTITIES
(SEE SCHEDULE)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
MAGDALENA
DATE

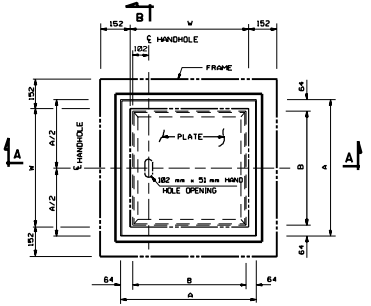
CHAIRMAN STANDARDS COMMITTEE
APPROVED
MAGDALENA
DATE

DEPUTY DIRECTOR

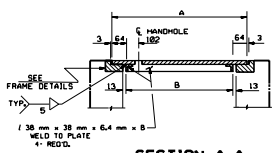
STANDARD DRAWING TITLE

(METRIC) STANDARD TRANSITION CONCRETE LINED DITCH TO PIPE OR DIVERSION BOX FOR 305 mm BOTTOM DITCH

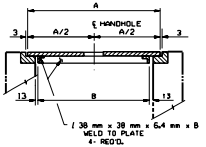
STD. DWG. NO.
1562A



PLAN

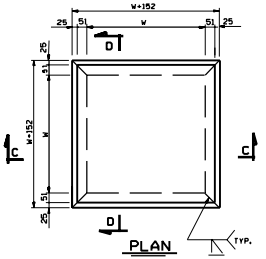


SECTION A-A

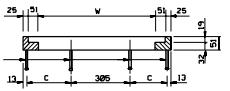


SECTION B-B

COVER DETAILS



PLAN



SECTION C-C

SECTION D-D SIMILAR

FRAME DETAILS

GENERAL NOTES

1. ALL STRUCTURAL STEEL SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 (ASTM A 709M, GRADE 250) AND SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A 123.

DESIGN DATA

THE DESIGN IS IN ACCORDANCE WITH AASHTO AND INTERIM SPECIFICATIONS:
Fs = 138 MPa
live load - MS 18 (HS 20-44)

DIMENSIONS (mm)					QUANTITIES (kg)		
W	A	B	C	T	COVER	FRAME	TOTAL
610	785	578	216	13	59	74	133
762	857	730	292	16	86	88	174

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | NO. | DATE

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: MAR 25 1999
CHAIRMAN, STANDARDS COMMITTEE
APPROVED: MAR 25 1999
DEPUTY DIRECTOR — DATE

(METRIC)
SHT. 1 OF 1

SOLID COVER FOR STANDARD
DRAWING 1551 MS-18 LOADING

STANDARD DRAWING TITLE

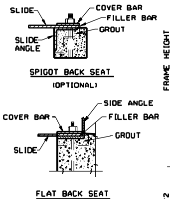
STD. DWG. NO.
1567

STANDARD SCREW GATE AND FRAME DIMENSIONS FOR 1524 mm OF HEAD OR LESS

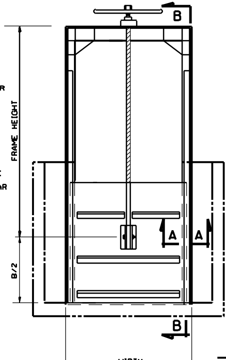
SIZE OF CLEAR ** OPENING	A	457	610	457	610	762	914	1219	610	762	914	1067	1219	610	762	914
	B	457	457	610	610	610	610	610	762	762	762	762	762	914	914	914
MINIMUM GATE DIMENSION	HEIGHT	457	457	610	610	610	610	610	762	762	762	762	762	914	914	914
	WIDTH	559	711	559	711	864	1041	1346	711	864	1041	1194	1321	737	889	1041
* FRAME HEIGHTS	1524	x	x	x	x	x	x		x	x				x	x	
	1829	x	x	x	x	x	x		x	x	x	x		x	x	x
	2134	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	2438	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	3048	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
STEM DIAMETER		28	28	28	28	28	28	28	28	28	28	28	38	28	28	28
WHEEL DIAMETER		254	254	254	25	25	36	610	356	356	356	457	610	36	457	457

SIZE OF CLEAR ** OPENING	A	1067	1219	1524	610	762	914	1067	1219	1524	1829	610	762	914	1067	1219
	B	914	914	914	1067	1067	1067	1067	1067	1067	1067	1219	1219	1219	1219	1219
MINIMUM GATE DIMENSION	HEIGHT	914	914	914	1067	1067	1067	1067	1067	1067	1067	1219	1219	1219	1219	1219
	WIDTH	1194	1372	1702	737	889	1041	1194	1372	1702	2007	762	914	1067	1219	1372
* FRAME HEIGHTS	1524				x	x						x	x			
	1829	x			x	x	x	x				x	x	x	x	
	2134	x	x		x	x	x	x	x			x	x	x	x	x
	2438	x	x		x	x	x	x	x			x	x	x	x	x
	3048	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
STEM DIAMETER		38	38	38	28	28	38	38	38	38	51	38	38	38	38	38
WHEEL DIAMETER		610	610	762	457	457	610	610	762	610	762	610	610	610	762	762

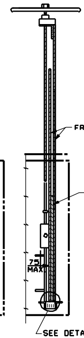
- * X INDICATES THE FRAME HEIGHT OPTIONS AVAILABLE WITH THE SPECIFIC GATE SIZES
- ** SCREW GATES SELECTED FROM THESE BASIC SIZE MAY BE USED WITH EITHER FLUMES, ROUND PIPE OR PIPE ARCH INSTALLATIONS.



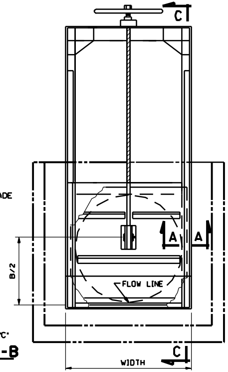
SECTION A-A



SCREW GATE INSTALLATION DETAIL FOR FLUME OUTLET

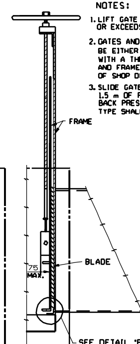


SECTION B-B



SCREW GATE INSTALLATION DETAIL FOR PIPE OUTLET

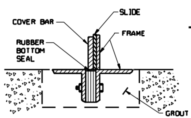
(ARCH PIPE INSTALLATION SIMILAR)



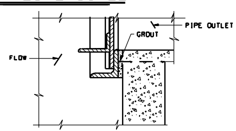
SECTION C-C

NOTES:

1. LIFT GATE IS PRINCIPALLY FOR USE WHEN OPENING IS EQUAL TO OR EXCEEDS AN AREA OF 0.5 m^2
2. GATES AND FRAMES SHALL BE OF THE TYPE SHOWN AND SHALL BE EITHER THE FLAT BACK SEAT OR SPIGOT BACK SEAT TYPES WITH A THROUGH FLUSH BOTTOM OPENING. EQUIVALENT GATE AND FRAME TYPES MAY BE ACCEPTABLE SUBJECT TO THE APPROVAL OF SHOP DRAWING BY THE ENGINEER.
3. SLIDE GATES AND FRAMES SHALL BE DESIGNED FOR NOT LESS THAN 1.5 m OF FACE PRESSURE ABOVE THE GATE OPENING AND ZERO BACK PRESSURE. IN ALL CASES OF INSTALLATION MANUFACTURERS TYPE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

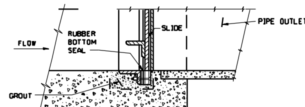


DETAIL "C"

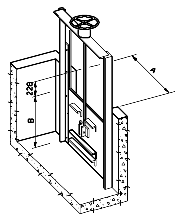


DETAIL "B"

(TYPICAL WALL SILL INSTALLATION)



TYP. PIPE FLOOR SILL INSTALLATION



FLUME OUTLET DETAIL

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE

APPROVED — DEPUTY DIRECTOR — MAR.09,1999 DATE

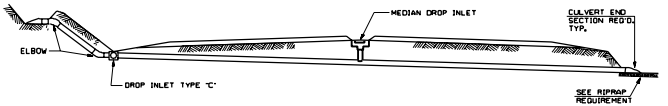
STANDARD SCREW GATE AND FRAME

(METRIC) SHT. 1 OF 1

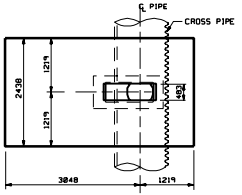
STANDARD DRAWING TITLE

STD. DWG. NO.

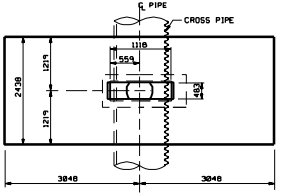
1584



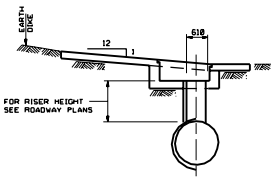
TYP. CROSS SECTION SHOWING MEDIAN DROP INLET AND DROP INLET TYPE "C"



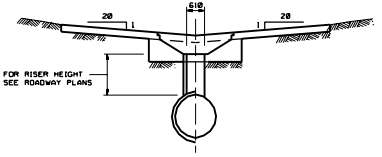
DIKE APRON PLAN



PLAN



DROP INLET TYPE "A"



DROP INLET TYPE "B"

DETAILS OF DROP INLET INTO PIPE CULVERT

GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO M 284 OR M 111 AND M 31M GRADE 400.

2- USE 610 mm DIA. PIPE RISER UNLESS OTHERWISE SPECIFIED.

3- TYPE II CEMENT (LOW ALKALI) REQUIRED.

4- ALL LADDER RUNGS SHALL BE MADE FROM EPOXY-COATED 20M REBAR.

5- USE GRATING AND BEARING ANGLES AS DESCRIBED ON STANDARD DRAWING 1703

6- CONCRETE DISPLACED BY PIPES SHALL BE DEDUCTED FROM QUANTITIES GIVEN IN THE APPROPRIATE TABLE.

7- IN ALL CASES GRATE SHALL BE ORIENTED WITH LONGITUDINAL AXIS PARALLEL TO MAJOR FLOW OF DITCH.

8- AN EARTH DIKE SHALL BE CONSTRUCTED AS PART OF DROP INLET. NO DIKE WILL BE REQUIRED FOR TYPE "B" DROP INLET.

9- NOT FOR USE WITH EITHER CORRUGATED POLYETHYLENE PIPE OR VITRIFIED CLAY PIPE.

10- A NOTE SHALL BE PLACED ON THE PLAN AND PROFILE SHEET CLEARLY DESCRIBING THE TYPE OF DROP INLET REQUIRED, THE RISER DIAMETER WHEN OTHER THAN 610 mm DIA., AND WHETHER OR NOT AN APRON IS REQUIRED AT THE APPROPRIATE STATION.

11- USE STRAIGHT 15M REBAR AT 305 mm CENTERS EXCEPT AS NOTED OTHERWISE. CUT AND FIELD BEND BARS WHERE NECESSARY TO CLEAR PIPES.

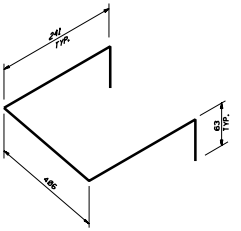
DESIGN DATA

MS 18 OR 20-44 OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

f'_c = 18 MPa
f_s = 160 MPa
n = 8

QUANTITIES

(SEE TABLES)



TYP. LADDER RUNG DETAIL

(SEE DROP INLET TYPE "C" AND "D" TABLES)

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

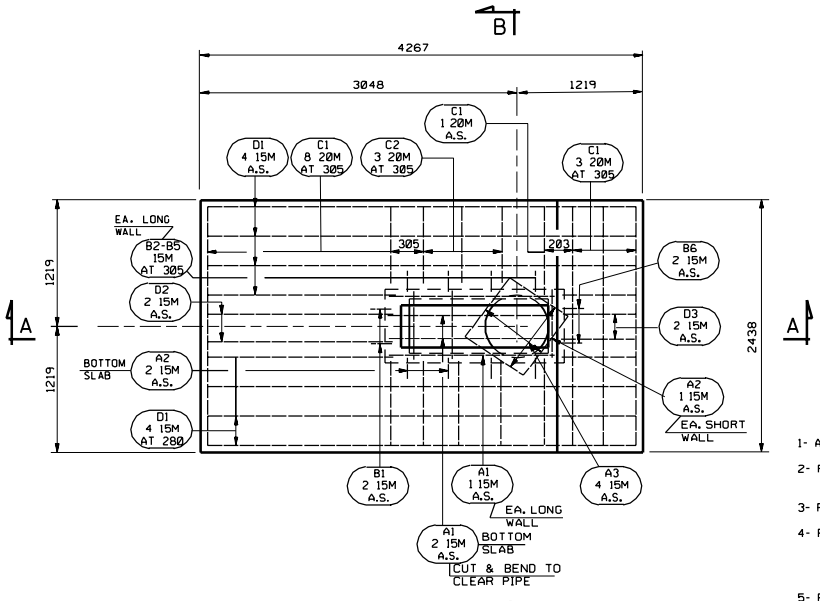
RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — MARCH 31, 1995 DATE
APPROVED
DEPUTY DIRECTOR — MARCH 31, 1995 DATE

(METRIC)
SHT. 1 OF 8

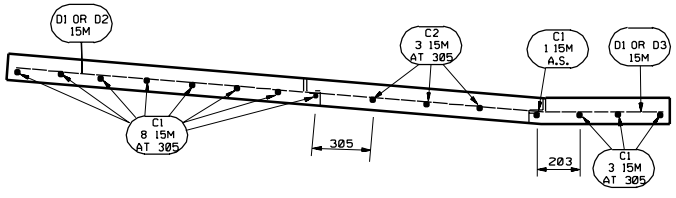
STANDARD DROP INLET DETAILS GENERAL NOTES AND INSTALLATION DETAIL

STANDARD DRAWING TITLE

STD. DWG. NO.
1624-1

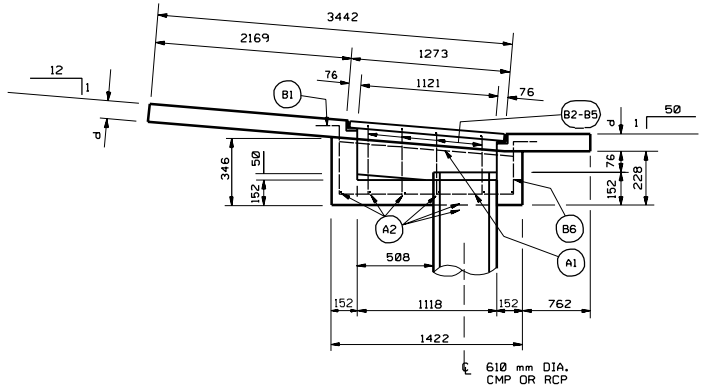


PLAN TYPE "A"



TYP. LONGITUDINAL APRON SECTION

(FOR TYPE "A" DROP INLET)



SECTION A-A

NOTES

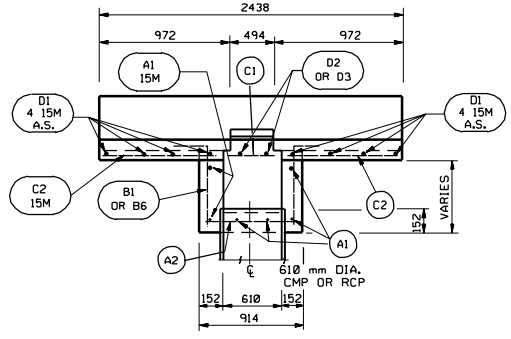
1- APRONS SHALL BE CENTERED ON DITCH.

2- PLACE 150 mm OF UNTREATED BASE COURSE AND COMPACT TO THE DENSITY INDICATED BY UDOT STANDARD SPECIFICATIONS UNDER EACH SLAB PRIOR TO FORMING.

3- FIELD BEND D1 BARS AS REQUIRED TO CONFORM TO SLOPE.

4- FOUR STANDARD ANCHOR BOLTS 19 mm DIA. X 152 mm REQUIRED. SPACE ABOUT 483 mm +/- ON PERIPHERY OF CMP PIPE RISER AND POSITION THEM 75 mm FROM END OF SAID RISER. ANCHOR BOLTS AND NUTS SHALL BE GALVANIZED. PAYMENT FOR FURNISHING AND PLACING ANCHOR BOLTS AND NUTS SHALL BE INCLUDED IN THE PRICE PER LINEAR METER OF PIPE.

5- PROVIDE 50 mm CONCRETE COVER TO REINFORCING STEEL EXCEPT WHERE NOTED OTHERWISE.



SECTION B-B

REINFORCING STEEL SCHEDULE

DROP INLET TYPE	DIMENSION (d)	A1 SIZE	A1 NO.	A1 LENGHT	A2 SIZE	A2 NO.	A2 LENGHT	A3 SIZE	A3 NO.	A3 LENGHT	B1 SIZE	B1 NO.	B1 a	B2 SIZE	B2 NO.	B2 a	B3 SIZE	B3 NO.	B3 a	B4 SIZE	B4 NO.	B4 a	B5 SIZE	B5 NO.	B5 a	B6 SIZE	B6 NO.	B6 a	C1 SIZE	C1 NO.	C1 LENGHT	C2 SIZE	C2 NO.	C2 LENGHT	D1 SIZE	D1 NO.	D1 LENGHT	D2 SIZE	D2 NO.	D2 LENGHT	D3 SIZE	D3 NO.	D3 LENGHT	QUANTITIES REINF STEEL kg.	QUANTITIES CONC. m³
A	203	15	8	1321	15	8	813	15	4	610	15	2	457	15	2	432	15	2	406	15	2	381	15	2	356	15	2	305	20	12	2337	20	6	864	15	8	4166	15	2	1651	15	2	1118	177.2	2.2

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	DATE	APPR.	REMARKS
1	04/10/01	B.A.	CORRECTED PROBLEM IN PRINTED VERSION. NO CHANGE TO DRAWING DETAILS.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — APR.10.2001 DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.10.2001 DATE

DEPUTY DIRECTOR — DATE

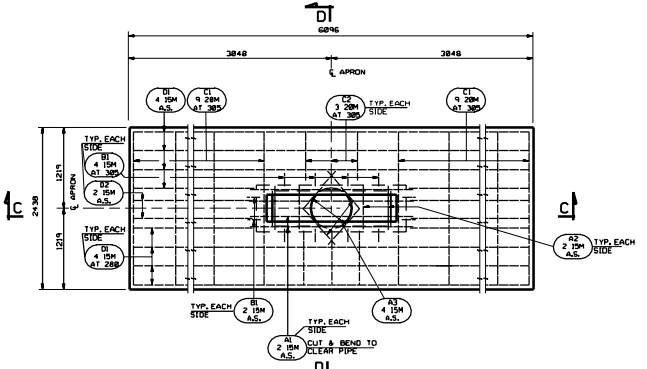
(METRIC) SHT. 2 OF 8

STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "A" DETAILS

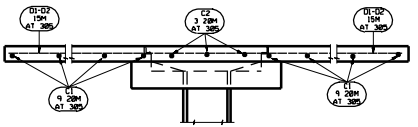
STANDARD DRAWING TITLE

STD. DWG. NO.

1624-2

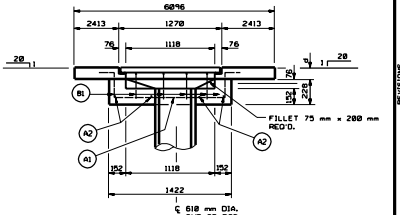


PLAN TYPE "B"



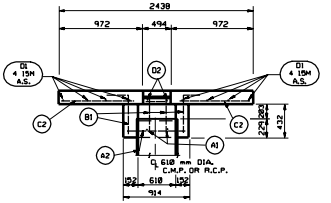
TYP. LONGITUDINAL APRON SECTION

(FOR TYPE "B" DROP INLET)



SECTION C-C

NOTE:
SEE SHEET 2 FOR NOTES.



SECTION D-D

REINFORCING STEEL SCHEDULE

DROP INLET TYPE	DIMENSION (d)	A1 SIZE	A1 NO.	A1 LENGHT	A2 SIZE	A2 NO.	A2 LENGHT	A3 SIZE	A3 NO.	A3 LENGHT	B1 SIZE	B1 NO.	B1 d	B1 356	C1 SIZE	C1 NO.	C1 LENGHT	C2 SIZE	C2 NO.	C2 LENGHT	D1 SIZE	D1 NO.	D1 LENGHT	D2 SIZE	D2 NO.	D2 LENGHT	QUANTITIES REINF. STEEL kg	QUANTITIES CONC. m³
B	203	15	6	1321	15	8	813	15	4	610	15	12	305		20	18	2337	20	6	864	15	8	5994	15	4	1651	229.2	3.1

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | APPD.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — MAR.25,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.25,1999 DATE

(METRIC)
SHT. 3 OF 8

STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "B" DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
1624-3

TABLE #1

MAX. PIPE SIZES 457 mm DIA. RCP OR 610 mm DIA. CMP

LINE NO.	DIMENSIONS H	K	W	M	REINFORCING STEEL A Length	A No.	B1 Length	B1 No.	B2 Length	B2 No.	C1 Length	C1 No.	C2 Length	C2 No.	D1 Length	D1 No.	D2 Length	D2 No.	D3 Length	D3 No.	D4 Length	D4 No.	D5 Length	D5 No.	G Length	G No.	QUANTITIES Standard Steel kg	Standard Conc. m^3	W/ATT'CH APRON Reinf. kg	W/ATT'CH APRON Conc. m^3
1	1067	762	610	115	1321	9	813	8	152	4	1321	2	813	4	1041	4	1016	2	991	2	965	2	940	4	1016	2	65.7	0.82	200.5	2.64
2	1219	914	↑	↑	↑	11	↑	10	↑	↑	↑	↑	↑	↑	1194	↑	1168	↑	1143	↑	1118	↑	1092	↑	↑	3	78.0	0.91	212.9	2.74
3	1372	1067				11		10							1346		1321		1295		1270		1245			3	81.2	1.00	216.1	2.83
4	1524	1219				13		12							1499		1473		1448		1422		1397			4	90.4	1.10	225.3	2.93
5	1676	1372				13		12							1651		1626		1600		1575		1549			4	96.8	1.19	231.8	3.02
6	1829	1524				15		14							1803		1778		1753		1727		1702			5	109.3	1.29	244.1	3.11
7	1981	1676				15		14							1956		1930		1905		1880		1854			5	112.4	1.38	247.3	3.21
8	2134	1829				17		16							2108		2083		2057		2032		2007			6	124.8	1.48	259.7	3.30
9	2286	1981				17		16							2261		2235		2210		2184		2159			6	128.1	1.57	262.9	3.40
10	2438	2134				19		18							2413		2388		2362		2337		2311			7	140.4	1.67	275.4	3.49
11	2591	2286	↓	↓	↓	19	↓	18	↓	↓	↓	↓	↓	↓	2565	↓	2540	↓	2515	↓	2489	↓	2464	↓	↓	7	144.1	1.76	279.0	3.59
12	2743	2438	610	115	1321	21	813	20	152	4	1321	2	813	4	2718	4	2692	2	2667	2	2642	2	2616	4	1016	8	156.5	1.85	291.3	3.68

TABLE #2

MAX. PIPE SIZES 610 mm DIA. RCP OR 762 mm DIA. CMP

LINE NO.	DIMENSIONS H	K	W	M	REINFORCING STEEL A Length	A No.	B1 Length	B1 No.	B2 Length	B2 No.	C1 Length	C1 No.	C2 Length	C2 No.	D1 Length	D1 No.	D2 Length	D2 No.	D3 Length	D3 No.	D4 Length	D4 No.	D5 Length	D5 No.	G Length	G No.	QUANTITIES Standard Steel kg	Standard Conc. m^3	W/ATT'CH APRON Reinf. kg	W/ATT'CH APRON Conc. m^3
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	1219	914	762	267	1321	13	965	10	305	4	1321	2	965	4	1194	4	1168	2	1143	2	1118	2	1092	4	1016	3	86.3	1.03	216.1	2.81
3	1372	1067	↑	↑	↑	13	↑	10	↑	↑	↑	↑	↑	↑	1346	↑	1321	↑	1295	↑	1270	↑	1245	↑	↑	3	89.5	1.13	219.3	2.91
4	1524	1219				15		12							1499		1473		1448		1422		1397			4	102.3	1.23	232.2	3.02
5	1676	1372				15		12							1651		1626		1600		1575		1549			4	105.5	1.33	235.4	3.12
6	1829	1524				17		14							1803		1778		1753		1727		1702			5	118.4	1.44	248.2	3.22
7	1981	1676				17		14							1956		1930		1905		1880		1854			5	122.1	1.54	251.9	3.32
8	2134	1829				19		16							2108		2083		2057		2032		2007			6	134.9	1.64	264.8	3.42
9	2286	1981				19		16							2261		2235		2210		2184		2159			6	138.1	1.74	268.0	3.52
10	2438	2134				21		18							2413		2388		2362		2337		2311			7	151.0	1.84	280.8	3.62
11	2591	2286	↓	↓	↓	21	↓	18	↓	↓	↓	↓	↓	↓	2565	↓	2540	↓	2515	↓	2489	↓	2464	↓	↓	7	154.2	1.94	284.0	3.73
12	2743	2438	762	267	1321	23	965	20	305	4	1321	2	965	4	2718	4	2692	2	2667	2	2642	2	2616	4	1016	8	167.0	2.04	296.9	3.83

TABLE #3

MAX. PIPE SIZES 762 mm DIA. RCP OR 914 mm DIA. CMP

LINE NO.	DIMENSIONS H	K		M	REINFORCING STEEL A Length	A No.	B1 Length	B1 No.	B2 Length	B2 No.	C1 Length	C1 No.	C2 Length	C2 No.	D1 Length	D1 No.	D2 Length	D2 No.	D3 Length	D3 No.	D4 Length	D4 No.	D5 Length	D5 No.	G Length	G No.	QUANTITIES Standard Steel kg	Standard Conc. m^3	W/ATT'CH APRON Reinf. kg	W/ATT'CH APRON Conc. m^3
1	1372	1067	914	419	1321	15	1118	10	457	4	1321	2	1118	4	1346	5	1321	2	1295	2	1270	2	1245	5	1016	3	102.3	1.26	226.2	3.00
2	1524	1219	↑	↑	↑	17	↑	12	↑	↑	↑	↑	↑	↑	1499	↑	1473	↑	1448	↑	1422	↑	1397	↑	↑	4	115.6	1.37	239.5	3.11
3	1676	1372				17		12							1651		1626		1600		1575		1549			4	119.8	1.48	243.6	3.21
4	1829	1524				19		14							1803		1778		1753		1727		1702			5	133.5	1.58	257.4	3.32
5	1981	1676				19		14							1956		1930		1905		1880		1854			5	137.2	1.69	261.1	3.43
6	2134	1829				21		16							2108		2083		2057		2032		2007			6	151.0	1.80	274.9	3.54
7	2286	1981				21		16							2261		2235		2210		2184		2159			6	155.1	1.91	279.0	3.65
8	2438	2134				23		18							2413		2388		2362		2337		2311			7	168.9	2.02	292.7	3.76
9	2591	2286	↓	↓	↓	23	↓	18	↓	↓	↓	↓	↓	↓	2565	↓	2540	↓	2515	↓	2489	↓	2464	↓	↓	7	172.5	2.13	296.4	3.86
10	2743	2438	914	419	1321	25	1118	20	457	4	1321	2	1118	4	2718	5	2692	2	2667	2	2642	2	2616	5	1016	8	186.3	2.23	310.2	3.97

TABLE #4

MAX. PIPE SIZES 914 mm DIA. RCP OR 1067 mm DIA. CMP

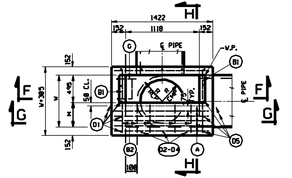
LINE NO.	DIMENSIONS H	K	W	M	REINFORCING STEEL A Length	A No.	B1 Length	B1 No.	B2 Length	B2 No.	C1 Length	C1 No.	C2 Length	C2 No.	D1 Length	D1 No.	D2 Length	D2 No.	D3 Length	D3 No.	D4 Length	D4 No.	D5 Length	D5 No.	G Length	G No.	QUANTITIES Standard Reinf. kg	Standard m^3	W/ATT'CH APRON Reinf. Steel	W/ATT'CH APRON m^3
1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	1524	1219	1067	572	1321	17	1270	12	610	4	1321	4	1270	4	1499	5	1473	2	1448	2	1422	2	1397	5	1016	4	124.8	1.50	248.7	3.20
3	1676	1372	↑	↑	↑	17	↑	12	↑	↑	↑	↑	↑	↑	1651	↑	1626	↑	1600	↑	1575	↑	1549	↑	↑	4	128.5	1.62	252.4	3.31
4	1829	1524				19		14							1803		1778		1753		1727		1702			5	143.2	1.73	267.1	3.43
5	1981	1676				19		14							1956		1930		1905		1880		1854			5	146.8	1.85	270.7	3.54
6	2134	1829				21		16							2108		2083		2057		2032		2007			6	161.1	1.96	284.9	3.66
7	2286	1981				21		16							2261		2235		2210		2184		2159			6	164.7	2.08	288.6	3.77
8	2438	2134				23		18							2413		2388		2362		2337		2311			7	179.0	2.19	302.8	3.89
9	2591	2286	↓	↓	↓	23	↓	18	↓	↓	↓	↓	↓	↓	2565	↓	2540	↓	2515	↓	2489	↓	2464	↓	↓	7	183.1	2.31	307.0	4.01
10	2743	2438	1067	572	1321	25	1270	20	610	4	1321	4	1270	4	2718	5	2692	2	2667	2	2642	2	2616	5	1016	8	197.3	2.43	321.2	4.12

NOTES:

1- FOR TYPICAL FLOOR PLAN SEE SHEET 7 OF 8.

2- PLACE 1-"A" BAR OR 3-"A" BARS AT 75 mm SPACING ADJACENT TO OPENING IN TOP SLAB OF BOX DESCRIBED BY TABLE 1 AND TABLE 2, RESPECTIVELY. PLACE 5-"A" BARS AT 75 mm SPACING AS PREVIOUSLY DESCRIBED IN ALL OTHER TABLES. ALL ADDITIONAL BARS, WHERE APPLICABLE, ARE SPACED AT 305 mm MAX.

3- THE OPTION- W/ATT'CH APRON IS BASED ON MODIFYING THE STANDARD BOX SHOWN. DELETE THE TOP SLAB WITH THE APPROPRIATE REINFORCING STEEL AND REPLACE IT WITH ONE OF THE APRONS SHOWN ON SHEET 5.



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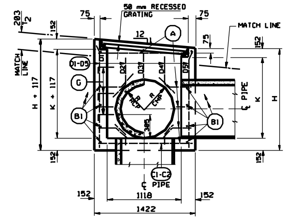
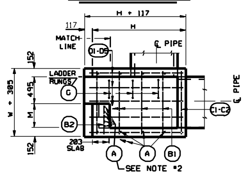
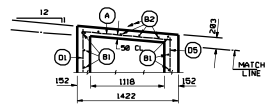


SECTION F-F



SECTION H-H



PARTIAL SECTION G-G

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

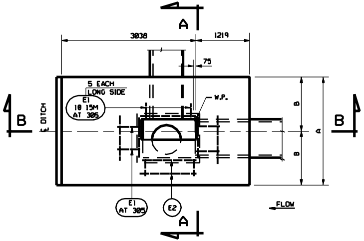
RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 4 OF 8

STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "C" DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
1624-4



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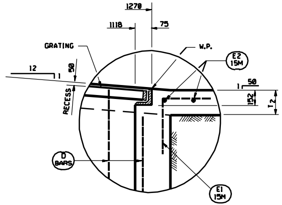


DETAIL "C"

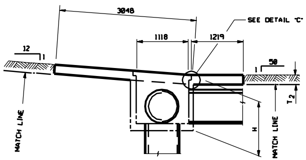
NOTES:

1- EACH LINE REPRESENTS ONE COMPLETE STRUCTURE OF THE KIND SPECIFIED. LINE AND TABLE NUMBERS WITHIN THE DRAWING SET CORRESPOND. BASIC DROP INLET BOX DIMENSIONS AND REINFORCEMENT DETAILS BELOW MATCH LINE ARE GIVEN IN TABLES 1 THRU 4, AND TABLES 5 THRU 9 OF THE TYPE SPECIFIED. ALL WALL REBAR SHALL BE EXTENDED INTO ATTACHED APRON.

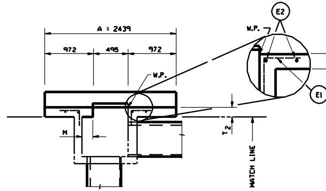
2- ALL BARS (INCLUDING 15M BARS) ARE STRAIGHT UNLESS OTHERWISE SHOWN.

3- FOR M, M1 AND M2 DIMENSIONS SEE TYPE "C" AND "D" DIMENSION SCHEDULES SHEETS 4 AND 8.

APRON DIMENSIONS			
TABLE NO	T■	A	B
1 THRU 4	203	2438	1219
5	229	2438	1219
6	229	2858	1429
7	254	3156	1581
8	254	3467	1734
9	254	3772	1886



SECTION B-B



SECTION A-A

APRON OPTION DETAILS
(DROP INLET TYPE "C")

APRON REINFORCING STEEL SCHEDULE

APRON TO BE USED WITH TABLES 1 THRU 4					APRON TO BE USED WITH TABLE 5				
MARK	NO.	LENGTH	TOTAL LENGTH	TOTAL WT. PER APRON	MARK	NO.	LENGTH	TOTAL LENGHTH	TOTAL WT. PER APRON
C1	16	2337	37 389	145.8 kg	C1	16	2337	37 389	149.3 kg
C2	6	864	5182		C2	6	864	5182	
D1	8	4166	33 325		D1	8	4166	33 325	
D2	1	1753	1753		D2	1	1753	1753	
D3	1	1194	1194		D3	1	1194	1194	
E1	14	711	9957		E1	16	711	11 379	
E2	2	1118	2235		E2	2	1219	2438	
E3	2	914	1829		E3	2	1219	2438	

APRON TO BE USED WITH TABLE 6					APRON TO BE USED WITH TABLE 7				
MARK	NO.	LENGTH	TOTAL LENGTH	TOTAL WT. PER APRON	MARK	NO.	LENGTH	TOTAL LENGTH	TOTAL WT. PER APRON
C1	16	2743	43 891	167.8 kg	C1	16	3048	48 768	195.4 kg
C2	6	1067	6401		C2	6	1219	7315	
D1	8	4166	33 325		D1	10	4166	41 656	
D2	1	1753	1753		D2	1	1753	1753	
D3	1	1194	1194		D3	1	1194	1194	
E1	20	711	14 224		E1	24	711	17 069	
E2	2	1524	3048		E2	2	1676	3353	
E3	2	1524	3048		E3	2	1676	3353	

APRON TO BE USED WITH TABLE 8					APRON TO BE USED WITH TABLE 9				
MARK	NO.	LENGTH	TOTAL LENGTH	TOTAL WT. PER APRON	MARK	NO.	LENGTH	TOTAL LENGTH	TOTAL WT. PER APRON
C1	16	3353	53 645	210.2 kg	C1	16	3658	58 522	233.1 kg
C2	6	1372	8230		C2	6	1524	9144	
D1	10	4166	41 656		D1	12	4166	49 987	
D2	1	1753	1753		D2	1	1753	1753	
D3	1	4242	1194		D3	1	1194	1194	
E1	24	711	17 069		E1	28	711	19 914	
E2	2	1829	3658		E2	2	1981	3962	
E3	2	1829	3658		E3	2	1981	3962	

E1 BAR

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	[illegible]	APPR.	REMARKS

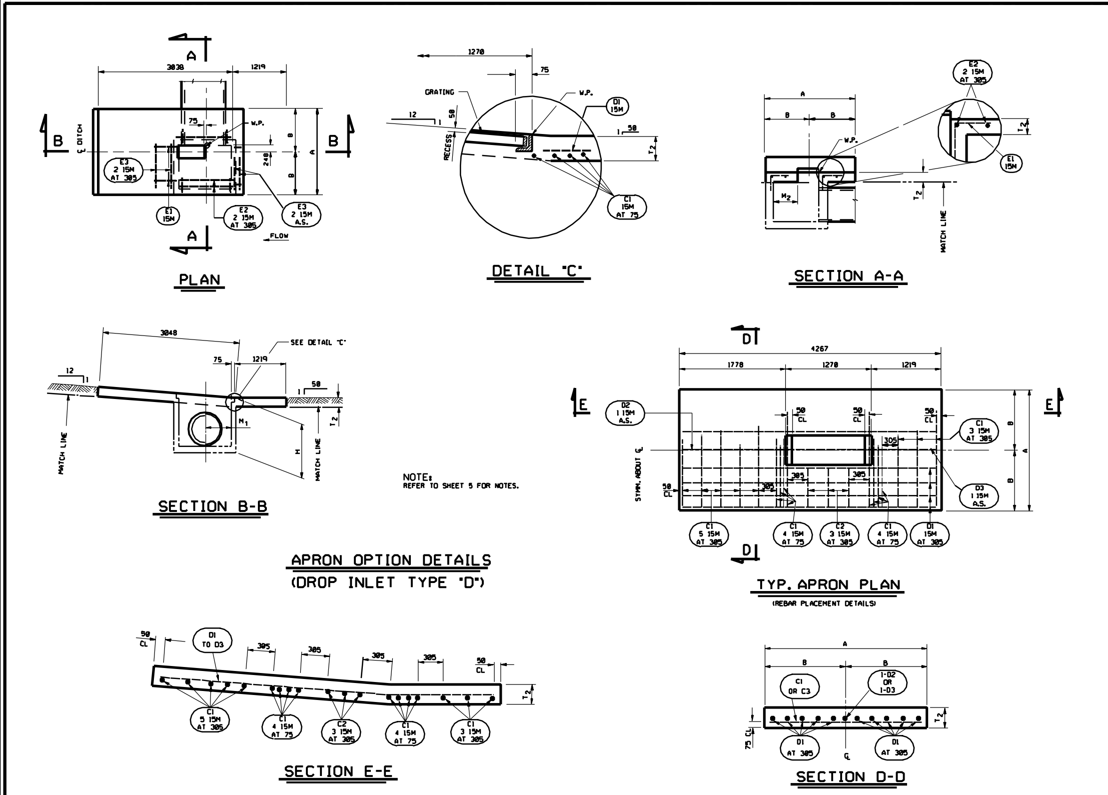
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED
MAR.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 5 OF 8

STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET WITH ATTACHED APRON DETAILS
STANDARD DRAWING TITLE

STD. DWG. NO.
1624-5



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

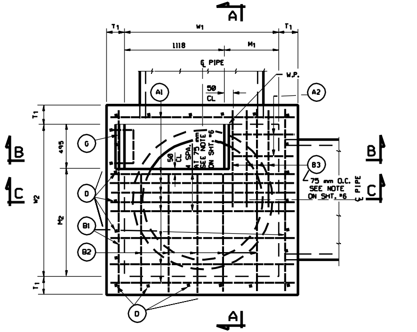
RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 6 OF 8

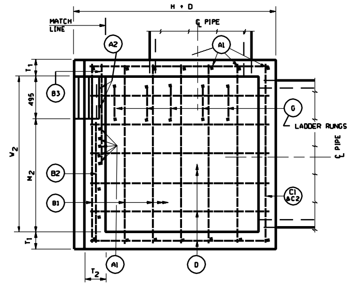
STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET WITH ATTACHED APRON DETAILS

STANDARD DRAWING TITLE

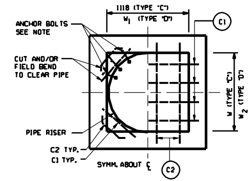
STD. DWG. NO.
1624-6

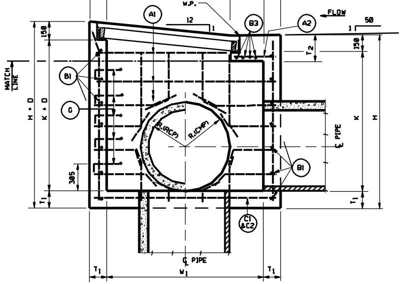


PLAN

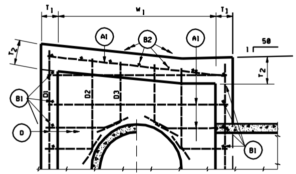


SECTION A-A

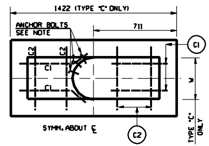




SECTION B-B



PARTIAL SECTION C-C



TYP. FLOOR PLAN WITH /WITHOUT PIPE RISER

(DROP INLET FOR TYPE "C" & "D")

NOTES:

1- FOR REINFORCING STEEL AND CONCRETE QUANTITIES SEE SHEET 8 OF 8.

2- PLACE 5 - A1 AND 5 - B3 BARS AT 75 mm SPACING FROM OPENING IN TOP SLAB OF EACH BOX. ALL ADDITIONAL BARS WHERE REQUIRED SHALL BE SPACED AT 305 mm MAX. O.C.. IN TABLE #5 ONLY 1 - B3 BAR IS REQUIRED FOR EACH BOX. ALL OTHER BARS SHALL BE SPACED AS PREVIOUSLY DESCRIBED.

3- PLACE IN FLOOR OF BOX AROUND THE PERIPHERY OF EACH CMP RISER. STANDARD ANCHOR BOLTS 19 mm X 150 mm ON 610 mm CENTERS. POSITION ANCHOR BOLTS 75 mm FROM END OF RISER. ANCHOR BOLTS AND NUTS SHALL CONFORM TO ASTM SPECIFICATION A 307 AND A 563, GRADE C, RESPECTIVELY.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE APPROVED — MAR. 09, 1999 DATE

DEPUTY DIRECTOR — MAR. 09, 1999 DATE

(METRIC)
SHT. 7 OF 8

STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "D" DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
1624-7

TABLE "5"

MAX. PIPE SIZES : 1067 mm DIA. RCP OR 1219 mm DIA. CMP — D = 127 mm, T_1 = 152 mm, T_2 = 229 mm

LINE NO	DIMENSIONS H	K	W_1	M_1	W_2	M_2	REINFORCING STEEL A1 LENGTH	NO	A2 LENGTH	NO	B1 LENGTH	NO	B2 LENGTH	NO	B3 LENGTH	NO	C1 LENGTH	NO	C2 LENGTH	NO	D1 LENGTH	NO	D2 LENGTH	NO	D3 LENGTH	NO	D4 LENGTH	NO	D5 LENGTH	NO	D6 LENGTH	NO	D7 LENGTH	NO	D8 LENGTH	NO	G LENGTH	NO	QUANTITIES STANDARD REINF. STEEL kg.	STANDARD CONC. m^3	W/ATT'CH APRON REINF. STEEL kg.	W/ATT'CH APRON CONC. m^3
1	1676	1372	1219	182	1219	724	1422	18			1422	12	762	4	914	1	1422	4	1422	4	1676	5	1651	2	1626	2	1588	2	1575	5							1816	4	141.3	1.89	265.2	3.71
2	1829	1524						20				14									1829	6	1803	4	1778	4	1753	4	1727	4								4	149.1	2.01	273.8	3.84
3	1981	1676						20				14									1981	6	1956	4	1930	4	1905	4	1880	4								5	168.1	2.14	284.8	3.97
4	2134	1829						22				16									2134	6	2108	4	2083	4	2057	4	2032	4								5	173.8	2.27	296.4	4.09
5	2286	1981						22				16									2286	6	2261	4	2235	4	2210	4	2184	4								6	179.8	2.48	382.8	4.22
6	2438	2134						24				18									2438	6	2413	4	2388	4	2362	4	2337	4								6	191.8	2.52	315.7	4.35
7	2591	2286						24				18									2591	6	2565	4	2540	4	2515	4	2489	4								7	197.8	2.65	321.7	4.48
8	2743	2438	1219	182	1219	724	1422	26			1422	28	762	4	914	1	1422	4	1422	4	2743	5	2718	2	2692	2	2667	2	2642	5							1816	7	218.6	2.78	334.5	4.68

TABLE "6"

MAX. PIPE SIZES : 1219 mm DIA. RCP OR 1524 mm DIA. CMP — D = 152 mm, T_1 = 152 mm, T_2 = 229 mm

LINE NO	DIMENSIONS H	K	W_1	M_1	W_2	M_2	REINFORCING STEEL A1 LENGTH	NO	A2 LENGTH	NO	B1 LENGTH	NO	B2 LENGTH	NO	B3 LENGTH	NO	C1 LENGTH	NO	C2 LENGTH	NO	D1 LENGTH	NO	D2 LENGTH	NO	D3 LENGTH	NO	D4 LENGTH	NO	D5 LENGTH	NO	D6 LENGTH	NO	D7 LENGTH	NO	D8 LENGTH	NO	G LENGTH	NO	QUANTITIES STANDARD REINF. STEEL kg.	STANDARD CONC. m^3	W/ATT'CH APRON REINF. STEEL kg.	W/ATT'CH APRON CONC. m^3
1	1981	1676	1524	486	1524	1829	1727	21	432	2	1727	14	1867	5	914	5	1727	4	1727	4	1981	6	1956	2	1930	2	1905	2	1880	2	1854	6					1816	5	285.1	2.85	327.2	2.56
2	2134	1829						23				16									2134	6	2108	4	2083	4	2057	4	2032	4	2007	4						5	220.7	3.01	342.8	5.01
3	2286	1981						23				16									2286	6	2261	4	2235	4	2210	4	2184	4	2159	4						6	229.8	3.15	358.1	5.15
4	2438	2134						25				18									2438	6	2413	4	2388	4	2362	4	2337	4	2311	4						6	243.2	3.32	365.2	5.32
5	2591	2286						25				18									2591	6	2565	4	2540	4	2515	4	2489	4	2464	4						7	250.5	3.47	372.6	5.47
6	2743	2438	1524	486	1524	1829	1727	27	432	2	1727	28	1867	5	914	5	1727	4	1727	4	2743	6	2718	2	2692	2	2667	2	2642	2	2616	6					1816	7	266.1	3.63	388.2	5.63

TABLE "7"

MAX. PIPE SIZES : 1372 mm DIA. RCP OR 1676 mm DIA. CMP — D = 165 mm, T_1 = 152 mm, T_2 = 254 mm

LINE NO	DIMENSIONS H	K	W_1	M_1	W_2	M_2	REINFORCING STEEL A1 LENGTH	NO	A2 LENGTH	NO	B1 LENGTH	NO	B2 LENGTH	NO	B3 LENGTH	NO	C1 LENGTH	NO	C2 LENGTH	NO	D1 LENGTH	NO	D2 LENGTH	NO	D3 LENGTH	NO	D4 LENGTH	NO	D5 LENGTH	NO	D6 LENGTH	NO	D7 LENGTH	NO	D8 LENGTH	NO	G LENGTH	NO	QUANTITIES STANDARD REINF. STEEL kg.	STANDARD CONC. m^3	W/ATT'CH APRON REINF. STEEL kg.	W/ATT'CH APRON CONC. m^3
1	2134	1829	1676	559	1676	1181	1888	23	584	2	1888	16	1219	6	914	5	1888	4	1888	4	2134	7	2108	2	2083	2	2057	2	2032	2	2007	7					1816	5	245.2	3.46	391.9	5.87
2	2286	1981						23				16									2286	6	2261	4	2235	4	2210	4	2184	4	2159	4						6	257.4	3.63	408.4	5.84
3	2438	2134						25				18									2464	6	2438	4	2413	4	2388	4	2362	4	2337	4	2311	4					6	274.4	3.88	417.6	6.21
4	2591	2286						25				18									2616	6	2591	4	2565	4	2540	4	2515	4	2489	4	2464	4					7	282.7	3.97	425.4	6.38
5	2743	2438	1676	559	1676	1181	1888	27	584	2	1888	28	1219	6	914	5	1888	4	1888	4	2769	7	2743	2	2718	2	2692	2	2667	2	2642	2	2616	7			1816	7	288.5	4.14	443.2	6.55

TABLE "8"

MAX. PIPE SIZES : 1524 mm DIA. RCP OR 1829 mm DIA. CMP — D = 178 mm, T_1 = 152 mm, T_2 = 254 mm

LINE NO	DIMENSIONS H	K	W_1	M_1	W_2	M_2	REINFORCING STEEL A1 LENGTH	NO	A2 LENGTH	NO	B1 LENGTH	NO	B2 LENGTH	NO	B3 LENGTH	NO	C1 LENGTH	NO	C2 LENGTH	NO	D1 LENGTH	NO	D2 LENGTH	NO	D3 LENGTH	NO	D4 LENGTH	NO	D5 LENGTH	NO	D6 LENGTH	NO	D7 LENGTH	NO	D8 LENGTH	NO	G LENGTH	NO	QUANTITIES STANDARD REINF. STEEL kg.	STANDARD CONC. m^3	W/ATT'CH APRON REINF. STEEL kg.	W/ATT'CH APRON CONC. m^3
1	2286	1981	1829	711	1829	1334	2032	24	737	2	2032	16	1372	6	914	6	2032	4	2032	4	2311	7	2286	2	2261	2	2235	2	2210	2	2184	2	2159	7			1816	6	274.4	4.88	417.1	6.65
2	2438	2134						26				18									2464	6	2438	4	2413	4	2388	4	2362	4	2337	4	2311	4					6	293.7	4.26	425.4	6.84
3	2591	2286						26				18									2616	6	2591	4	2565	4	2540	4	2515	4	2489	4	2464	4					7	301.5	4.45	443.7	7.03
4	2743	2438	1829	711	1829	1334	2032	28	737	2	2032	28	1372	6	914	6	2032	4	2032	4	2769	7	2743	2	2718	2	2692	2	2667	2	2642	2	2616	7			1816	7	328.3	4.63	462.5	7.21

TABLE "9"

MAX. PIPE SIZES : 1676 mm DIA. RCP OR 1981 mm DIA. CMP — D = 191 mm, T_1 = 152 mm, T_2 = 254 mm

LINE NO	DIMENSIONS H	K	W_1	M_1	W_2	M_2	REINFORCING STEEL A1 LENGTH	NO	A2 LENGTH	NO	B1 LENGTH	NO	B2 LENGTH	NO	B3 LENGTH	NO	C1 LENGTH	NO	C2 LENGTH	NO	D1 LENGTH	NO	D2 LENGTH	NO	D3 LENGTH	NO	D4 LENGTH	NO	D5 LENGTH	NO	D6 LENGTH	NO	D7 LENGTH	NO	D8 LENGTH	NO	G LENGTH	NO	QUANTITIES STANDARD REINF. STEEL kg.	STANDARD CONC. m^3	W/ATT'CH APRON REINF. STEEL kg.	W/ATT'CH APRON CONC. m^3
1	2438	2134	1981	864	1981	1486	2184	26	889	2	2184	18	1524	7	914	6	2184	4	2184	4	2489	8	2464	2	2438	2	2413	2	2388	2	2362	2	2337	2	2311	8	1816	6	325.8	4.74	480.8	7.48
2	2591	2286	1981	864	1981	1486	2184	26	889	2	2184	18	1524	7	914	6	2184	4	2184	4	2642	8	2616	2	2591	2	2565	2	2540	2	2515	2	2489	2	2464	8	1816	7	335.8	4.94	495.8	7.67
3	2743	2438	1981	864	1981	1486	2184	28	889	2	2184	28	1524	7	914	6	2184	4	2184	4	2794	8	2769	2	2743	2	2718	2	2692	2	2667	2	2642	2	2616	8	1816	7	355.2	5.13	516.2	7.87

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REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

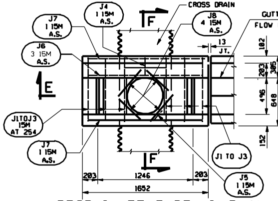
RECOMMENDED FOR APPROVAL — MARCH 1998
CHAIRMAN, STANDARDS COMMITTEE — DATE
APPROVED — MARCH 1998
DEPUTY DIRECTOR — DATE

(METRIC)
SHT. 8 OF 8

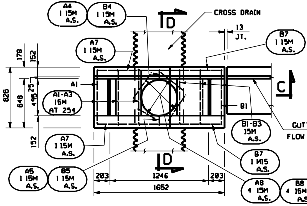
STANDARD CATCH BASIN AND CLEANOUT BOX DROP INLET TYPE "D" TABLES

STANDARD DRAWING TITLE

STD. DWG. NO.
1624-8



DROP INLET TYPE "J" PLAN



DROP INLET TYPE "A" & "B" PLAN

GENERAL NOTES

1. ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO M 284M OR M 111 AND M 31M GRADE 400, RESPECTIVELY.
2. PREFORMED JOINT FILLER SHALL BE AASHTO DESIGNATION M 213.
3. DROP INLET TYPE SHALL CORRESPOND TO CURB TYPE SELECTED ON STANDARD DRAWING NO. 615-1A.
4. NOT FOR USE WITH EITHER CORRUGATED POLYETHYLENE PIPE OR VITRIFIED CLAY PIPE.
5. USE GRATING AND BEARING ANGLES AS DESCRIBED ON STANDARD DRAWING 1703 IN TOP SLAB OPENING. (GRATING NOT SHOWN)
6. STANDARD ANCHOR BOLTS 19 mm x 152 mm REQUIRED. SPACE 483 mm ± ON PERIPHERY OF PIPE AND POSITION ANCHOR BOLTS 51 mm FROM END OF PIPE RISER. ANCHOR BOLTS AND NUTS SHALL BE GALVANIZED.
7. UNLESS OTHERWISE SHOWN WITHIN THE SCHEDULES, ALL DIMENSIONS ARE OUT-TO-OUT OF BAR.
8. CHAMFER ALL EXPOSED CONCRETE CORNERS 20 mm EXCEPT WHERE SPECIFIED OTHERWISE.
9. TYPE II CEMENT (LOW ALKALI) SHALL BE USED.

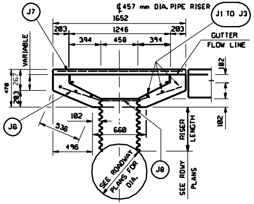
DESIGN DATA

MS 18 (HS20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

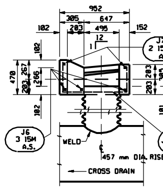
Fc = 10 MPa
Fs = 160 MPa
N = 8

QUANTITIES

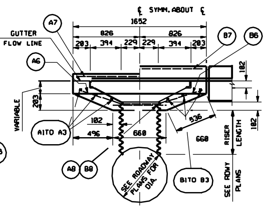
(SEE SCHEDULE FOR APPROPRIATE QUANTITIES)



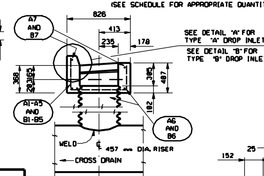
SECTION E-E



SECTION F-F



SECTION C-C



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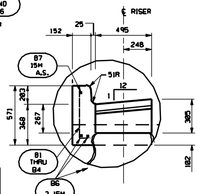
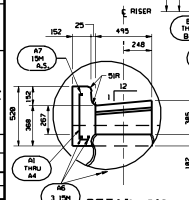


DETAIL "B"



DETAIL "A"

LOC.	MARK	SIZE	NO. BARS	LENGTH	TOTAL LENGTH	A	B	
DROP INLET TYPE "J"	J1	15	2	1499	7772	356	305	838; 1 SET (J1-J3) = 3886
	J2		2	1295		254	203	
	J3		2	1092		152	102	
	J4		1	610	610	356	254	
	J5		1	457	457	305	152	
	J6		3	1625	4875			155°; 559; 533 TYP.
	J7		2	1549	3098			
	J8	15	4	533	2132			
18.944 m OF 15M BARS AT 1.571 kg./m = 29.8 kg.								
QUANT.	CONCRETE CLASS AA (AE) .433 m³							
	REINFORCING STEEL							29.8 kg.

LOC.	MARK	SIZE	NO. BARS	LENGTH	TOTAL LENGTH	A	B	
DROP INLET TYPE "A"	A1	15	2	1422	7314	406	305	711; 1 SET (A1-A3) = 3657
	A2		2	1219		305	203	
	A3		2	1016		203	102	
	A4		1	558	558	406	152	
	A5		1	457	457	305	152	
	A6		3	1625	4875			155°; 559; 533 TYP.
	A7		2	1549	3098			
	A8	15	4	533	2132			
18.434 m OF 15M BARS AT 1.571 kg./m = 29.0 kg.								
QUANT.	CONCRETE CLASS AA (AE) .311 m³							
	REINFORCING STEEL							29.0 kg.

LOC.	MARK	SIZE	NO. BARS	LENGTH	TOTAL LENGTH	A	B	
DROP INLET TYPE "B"	B1	15	2	1473	7620	457	305	711; 1 SET (J1-J3) = 3810
	B2		2	1270		356	203	
	B3		2	1067		254	102	
	B4		1	609	609	457	152	
	B5		1	457	457	305	152	
	B6		3	1625	4875			155°; 559; 533 TYP.
	B7		2	1549	3098			
	B8	15	4	533	2132			
18.791 m OF 15M BARS AT 1.571 kg./m = 29.5 kg.								
QUANT.	CONCRETE CLASS AA (AE) .325 m³							
	REINFORCING STEEL							29.5 kg.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | APPR. | DATE | NO.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

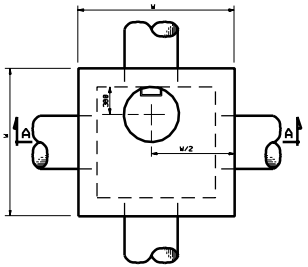
RECOMMENDED FOR APPROVAL — MAR. 09, 1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — MAR. 09, 1999 DATE

(METRIC)
SHT. 1 OF 1

STANDARD CURB AND GUTTER DROP INLET

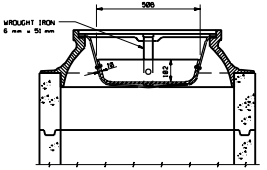
STANDARD DRAWING TITLE

STD. DWG. NO.
1627



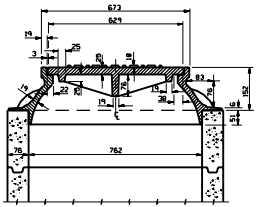
BOX PLAN

PRECAST GRADE RINGS ARE FURNISHED IN HEIGHTS OF 100 mm, 150 mm OR 200 mm. TOTAL HEIGHT OF GRADE RINGS NOT TO EXCEED 300 mm.



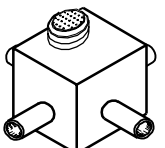
SECTION B-B

(PAN SECTION - LID REMOVED)

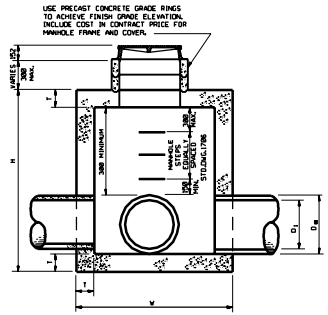


SECTION C-C

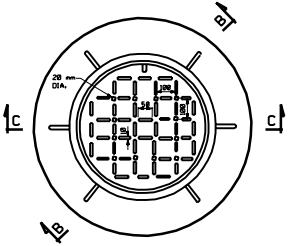
(LID SECTION - PAN REMOVED)



ISOMETRIC VIEW



SECTION A-A



MANHOLE PLAN

GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED, DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO DESIGNATION M 284M OR M 111 AND M 31M GRADE 400.

2- MANHOLE FRAME AND COVER MAY BE FURNISHED IN EITHER DUCTILE IRON (ASTM A 536 GRADE 60) OR CAST GRAY IRON : AASHTO M 105-96, CLASS 30B.

3- EXPOSED CORNERS SHALL BE CHAMFERED 20 mm EXCEPT WHERE NOTED OTHERWISE.

4- COVER TO REINFORCING STEEL SHALL BE 50 mm EXCEPT WHERE NOTED OTHERWISE.

5- ALL CAST-IN-PLACE CONCRETE SHALL BE CONCRETE (CLASS AA(AE)) EXCEPT WHERE NOTED OTHERWISE.

6- TYPE II CEMENT (LOW ALKALI) SHALL BE USED UNLESS SPECIFIED OTHERWISE IN THE SPECIAL PROVISIONS.

7- SEE ROADWAY PLANS FOR DETAILS OF INSTALLATION, INCLUDING LOCATION OF UNITS, NUMBER OF UNITS REQUIRED, TYPE OF UNITS, LOCATION AND SIZE OF PIPE(S).

8- A UNIT (CLEANOUT BOX SHALL INCLUDE MANHOLE COVER, PAN, FRAME, GRADE RINGS, MANHOLE STEPS IF REQUIRED AND BOX COMPLETE.

9- SEE STANDARD DRAWING 1706 FOR MANHOLE STEP DETAILS.

DESIGN DATA

MS 18 (HS 20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

STRUCTURAL CONCRETE: Fc : 18 MPa, Fs (REINF.): 168 MPa, N : 8

QUANTITIES

STRUCTURAL CONCRETE
REINFORCING STEEL — SEE SCHEDULE OF INSTALLATION

INDEX OF SHEETS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			REMARKS
NO.		APPR.	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN, STANDARDS COMMITTEE — DATE: MARCH 25, 1999
APPROVED
DEPUTY DIRECTOR — DATE: MARCH 25, 1999

(METRIC)
SHT. 1 OF 3

STANDARD DIVERSION BOX WITH MANHOLE COVER SITUATION AND LAYOUT

STANDARD DRAWING TITLE

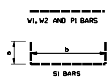
STD. DWG. NO.
1653-1

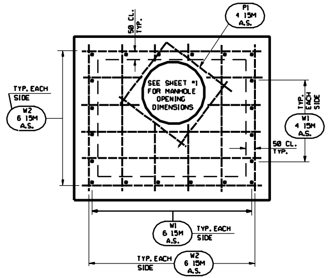
SCHEDULE OF INSTALLATION

LINE	DIMENSIONS H	W	T	A	MAX. PIPE DIA. RCP	CMP	REINFORCING STEEL S1 a	S1 b	S1 LENGTH	S1 QT	W1 LENGTH	W1 QT	W2 N	W2 LENGTH	W2 QT	P1 LENGTH	P1 QT	MAN STEP QT	QUANTITIES CONC. m^3	REINF. STEEL kg	FRAME COVER kg	LINE
1	1219	1524	203	254	381	457	457	1219	2134	12	914	20	2	1422	20	1067	4	2	1.724	120.3	111.1	1
2	1321	1524		152	457	533		1219	2134		1016		3	1422	24			2	1.833	132.4		2
3	1422	1524		203	610	610		1219	2134		1118		3	1422	24			2	1.942	135.6		3
4	1524	1829		254	610	762		1524	2438		1219		3	1727	24			3	2.743	156.0		4
5	1626			152	686	914					1321		4		28			3	2.878	170.0		5
6	1727			203	762	914					1422		4		28			3	3.012	173.2		6
7	1829			254	914	1067					1524		4		28			4	3.146	176.4		7
8	1930			152	914	1219					1626		5		32			4	3.280	190.5		8
9	2032			203	1067	1219					1727		5		32			4	3.414	193.6		9
10	2134			254		1372					1829		5		32			5	3.548	196.8		10
11	2235			152							1930		6		36			5	3.683	210.8		11
12	2337			203							2032		6		36			5	3.817	214.0		12
13	2438			254							2134		6		36			6	3.951	217.3		13
14	2540			152							2235		7		40			6	4.086	231.3		14
15	2642			203							2337		7		40			6	4.220	234.5		15
16	2743			254							2438		7		40			7	4.354	237.6		16
17	2845			152							2540		8		44			7	4.489	251.7		17
18	2946			203							2642		8		44			7	4.622	254.9		18
19	3048			254							2743		8		44			8	4.759	258.1		19
20	3150			152							2845		9		48			8	4.891	272.1		20
21	3251			203							2946		9		48			8	5.025	275.3		21
22	3353			254							3048		9		48			9	5.159	278.5		22
23	3454			152							3150		10		52			9	5.294	292.5		23
24	3556			203							3251		10		52			9	5.428	295.7		24
25	3658			254							3353		10		52			10	5.562	298.9		25
26	3759			152							3454		11		56			10	5.697	312.9		26
27	3861			203							3556		11		56			10	5.830	316.1		27
28	3962			254							3658		11		56			11	5.965	319.3		28
29	4064			152							3759		12		60			11	6.100	333.3		29
30	4166			203							3861		12		60			11	6.233	336.6		30
31	4267			254							3962		12		60			12	6.368	339.7		31
32	4369			152							4064		13		64			12	6.502	353.8		32
33	4470			203							4166		13		64			12	6.636	357.0		33
34	4572			254							4267		13		64			13	6.770	360.1		34
35	4674			152							4369		14		68			13	6.905	374.2		35
36	4775			203							4470		14		68			13	7.038	377.4		36
37	4877			254							4572		14		68			14	7.173	380.6		37
38	4978			152							4673		15		72			14	7.308	394.6		38
39	5080			203							4775		15		72			14	7.308	394.6		39
40	5182			254							4877		15		72			15	7.576	401.0		40
41	5283			152							4978		16		76			15	7.710	415.0		41
42	5385			203							5080		16		76			15	7.844	418.2		42
43	5486			254							5182		16		76			16	7.979	421.4		43
44	5588			152							5283		17		80			16	8.113	453.4		44
45	5690			203							5385		17		80			16	8.247	438.6		45
46	5791			254							5484		17		80			17	8.381	441.8		46
47	5893			152							5588		18		84			17	8.516	455.9		47
48	5994			203							5690		18		84			17	8.650	459.1		48
49	6096			254							5791		18		84			18	8.784	459.2		49
50	6198			152							5893		19		88			18	8.918	476.3		50
51	6299			203							5994		19		88			18	9.052	479.4		51
52	6401			254							6096		19		88			19	9.187	482.6		52
53	6502			152							6198		20		92			19	9.321	496.7		53
54	6604			203							6299		20		92			19	9.455	499.9		54
55	6706			254							6401		20		92			20	9.590	503.1		55
56	6807			152							6502		21		96			20	9.724	517.1		56
57	6909			203							6604		21		96			20	9.858	520.3		57
58	7010			254							6706		21		96			21	9.992	523.5		58
59	7112			152							6807		22		100			21	10.127	537.5		59
60	7214			203							6909		22		100			21	10.261	540.7		60
61	7315			254							7010		22		100			22	10.395	543.9		61
62	7417			152							7112		23		104			22	10.529	557.9		62
63	7518			203							7214		23		104			22	10.663	561.1		63
64	7620	1829	203	254	1067	1372	457	1524	2438	12	7315	20	23	1727	104	1067	4	23	10.798	564.3	111.1	64

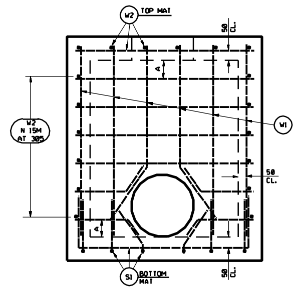
TABLE "A"

RCP DIA.	RCP m^3	CMP DIA.	CMP m^3
305	0.028	305	0.016
381	0.041	381	0.023
457	0.054	457	0.034
533	0.073	533	0.045
610	0.093	610	0.060
686	0.115	762	0.093
762	0.141	914	0.134
838	0.169	1067	0.182
914	0.200	1219	0.237
1067	0.268	1372	0.300

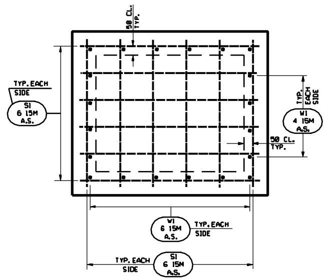




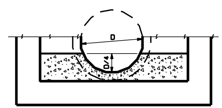
PLAN OF TOP SLAB



TYPICAL WALL ELEVATION



PLAN OF BOTTOM SLAB



FORMED INVERT DETAIL

GENERAL NOTES

1. CONCRETE DISPLACED BY PIPE(S) SHALL BE DEDUCTED FROM THOSE CONCRETE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION IN ACCORDANCE WITH TABLE "A".
2. THE BOTTOM SLAB OF THE BOX SHALL BE FORMED TO FIT THE INVERT OF THE PIPE(S) WHEN SO REQUIRED ACCORDING TO THE DETAIL SHOWN ON THIS SHEET (FORMED INVERT).
3. QUANTITIES SHOWN IN THE SCHEDULE OF INSTALLATION ARE FOR ONE UNIT ONLY.
4. FIELD CUT OR BEND REINFORCING STEEL AS NECESSARY TO CLEAR PIPE(S) AND MAINTAIN 50 mm MINIMUM CLEARANCE.
5. UNLESS OTHERWISE SHOWN ALL DIMENSIONS ARE OUT-TO-OUT OF BARS.
6. WEIGHT QUANTITIES FOR MANHOLE FRAME AND COVER ARE SHOWN FOR INFORMATION ONLY.
7. SEE SHEET 1 FOR DIMENSIONS. SEE STANDARD DRAWING 1706 FOR MANHOLE STEP DETAILS.
8. PIPE DIAMETERS SHOWN IN TABLES AND SCHEDULES ARE INSIDE DIAMETERS.
9. WHEN FORMED INVERT IS REQUIRED, ADDITIONAL CONCRETE SHALL BE ADDED TO QUANTITIES SHOWN IN SCHEDULE OF INSTALLATION.
10. MAXIMUM PIPE DIMENSIONS SHOWN IN SCHEDULE OF INSTALLATION ARE FOR PIPES PERPENDICULAR TO WALLS OF BOX. CLEARANCES SHOULD BE DETERMINED FOR SKEWED PIPES.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR. 09, 1999 — DATE

CHAIRMAN STANDARDS COMMITTEE APPROVED — MAR. 09, 1999 — DATE

DEPUTY DIRECTOR

(METRIC)
SHT. 2 OF 3

STANDARD DIVERSION BOX WITH MANHOLE COVER 0-1067 RCP & 0-1372 CMP

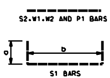
STANDARD DRAWING TITLE

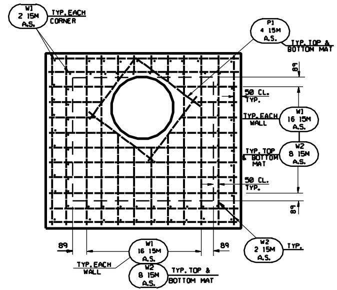
STD. DWG. NO.
1653-2

SCHEDULE OF INSTALLATION

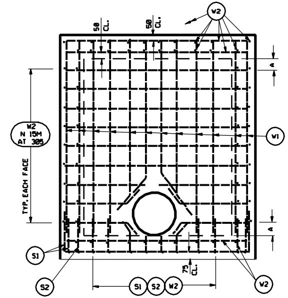
LINE	DIMENSIONS						REINFORCING STEEL														QUANTITIES			LINE
	H	W	T	A	MAX. PIPE DIA.		S1				S2		W1		W2			P1		MAN STEP	CONC.	REINF. STEEL	FRAME COVER	
					RCP	CMP	a	b	LENGTH	QT	LGTH	QT	LGTH	QT	N	LGTH	QT	LGTH	QT	QT	m³	kg	kg	
65	2438	2743	254	203	1219	1524	610	2642	3861	20	610	36	2134	72	6	2642	108	1067	8	5	8.589	858.3	111.1	65
66	2540	↑	↑	254	1372	1676	↑	↑	↑	↑	↑	↑	2235	↑	6	↑	108	↑	↑	5	8.846	856.3	↑	66
67	2642			152	1524	1829							2337		7		116			6	9.103	901.0		67
68	2743			203	1524	1829							2438		7		116			6	9.360	912.5		68
69	2845			254	1676	1981							2540		7		116			6	9.617	924.0		69
70	2946			152	1676	2134							2642		8		124			7	9.873	968.7		70
71	3048			203	1829	↑							2743		8		124			7	10.130	980.1		71
72	3150			254	↑								2845		8		124			7	10.387	991.7		72
73	3251			152									2946		9		132			8	10.644	1036.3		73
74	3353			203									3048		9		132			8	10.901	1047.8		74
75	3454			254									3150		9		132			8	11.158	1059.3		75
76	3556			152									3251		10		140			9	11.415	1103.9		76
77	3658			203									3353		10		140			9	11.672	1115.4		77
78	3759			254									3454		10		140			9	11.929	1126.9		78
79	3861			152									3556		11		148			10	12.185	1171.8		79
80	3962			203									3658		11		148			10	12.442	1183.1		80
81	4064			254									3759		11		148			10	12.899	1194.5		81
82	4166			152									3861		12		156			11	12.956	1239.2		82
83	4267			203									3962		12		156			11	13.213	1250.7		83
84	4369			254									4064		12		156			11	13.470	1262.2		84
85	4470			152									4166		13		164			12	13.727	1306.9		85
86	4572			203									4267		13		164			12	13.984	1318.3		86
87	4674			254									4369		13		164			12	14.241	1329.8		87
88	4775			152									4470		14		172			13	14.497	1374.4		88
89	4877			203									4572		14		172			13	14.754	1386.0		89
90	4978			254									4674		14		172			13	15.011	1397.5		90
91	5080			152									4775		15		180			14	15.268	1442.1		91
92	5182			203									4877		15		180			14	15.525	1453.6		92
93	5283			254									4978		15		180			14	15.782	1465.1		93
94	5385			152									5080		16		188			15	16.039	1509.8		94
95	5486			203									5182		16		188			15	16.296	1521.3		95
96	5588			254									5283		16		188			15	16.553	1532.7		96
97	5690			152									5385		17		196			16	16.809	1577.4		97
98	5791			203									5486		17		196			16	17.066	1588.8		98
99	5893			254									5588		17		196			16	17.323	1600.4		99
100	5994			152									5690		18		204			17	17.580	1645.1		100
101	6096			203									5791		18		204			17	17.837	1656.5		101
102	6198			254									5893		18		204			17	18.094	1668.0		102
103	6299			152									5994		19		212			18	18.351	1712.6		103
104	6401			203									6096		19		212			18	18.608	1724.2		104
105	6502			254									6198		19		212			18	18.865	1735.7		105
106	6604			152									6299		20		220			19	19.121	1780.3		106
107	6706			203									6401		20		220			19	19.378	1791.8		107
108	6807			254									6502		20		220			19	19.635	1803.2		108
109	6909			152									6604		21		228			20	19.892	1848.0		109
110	7010			203									6706		21		228			20	20.149	1859.5		110
111	7112			254									6807		21		228			20	20.406	1870.9		111
112	7214			152									6909		22		236			21	20.663	1915.8		112
113	7315			203									7010		22		236			21	20.920	1927.0		113
114	7417			254									7112		22		236			21	21.177	1938.6		114
115	7518			152									7214		23		244			22	21.433	1983.3		115
116	7620			203									7315		23		244			22	21.690	1994.7		116
117	7722			254									7417		23		244			22	21.947	2006.2		117
118	7823			152									7518		24		252			23	22.204	2050.8		118
119	7925			203									7620		24		252			23	22.461	2062.4		119
120	8026			254									7722		24		252			23	22.718	2073.9		120
121	8128			152									7823		25		260			24	22.975	2118.5		121
122	8230			203									7925		25		260			24	23.232	2130.0		122
123	8331			254									8026		25		260			24	23.489	2141.4		123
124	8433			152									8128		26		268			25	23.745	2186.1		124
125	8534			203									8230		26		268			25	24.002	2197.7		125
126	8636			254									8331		26		268			25	24.259	2209.1		126
127	8738	↓	↓	152	↓	↓	↓	↓	↓	↓	↓	↓	8433	↓	27	↓	276	↓	↓	26	24.516	2253.8	↓	127
128	8839	2743	254	203	1829	2134	610	2642	3861	20	610	36	8534	72	27	2642	276	1067	8	26	24.773	2265.2	111.1	128

TABLE "A"			
RCP		CMP	
DIA.	m³	DIA.	m³
1219	0.433	1524	0.463
1372	0.544	1676	0.560
1524	0.667	1829	0.667
1676	0.804	1981	0.783
1829	0.952	2134	0.908

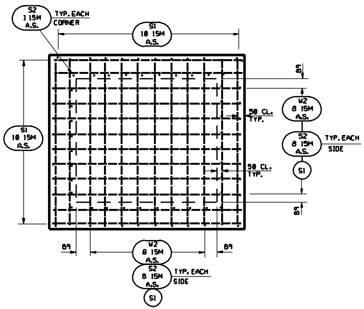




PLAN OF TOP SLAB



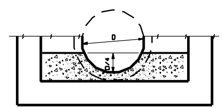
TYPICAL WALL ELEVATION



PLAN OF BOTTOM SLAB

SEE SHEET 1 FOR MANHOLE OPENING DIMENSIONS.

SEE SHEET 2 FOR NOTES.



FORMED INVERT DETAIL

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

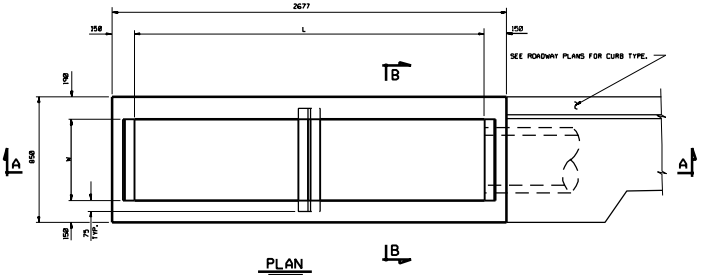
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 3 OF 3

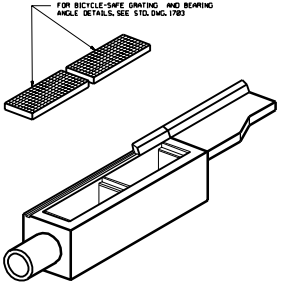
STANDARD DIVERSION BOX WITH MANHOLE COVER 1219-1829 RCP AND 1524-2134 CMP

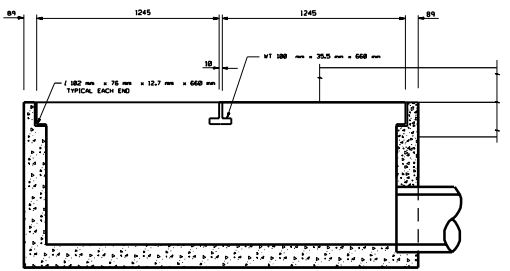
STANDARD DRAWING TITLE

STD. DWG. NO.
1653-3

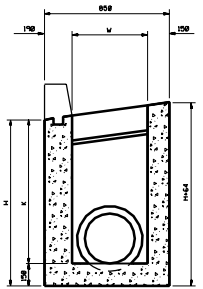


PLAN





SECTION A-A



SECTION B-B

GENERAL NOTES

1. ALL REINFORCING STEEL SHALL BE COATED DEFORMED BILLET STEEL BARS CONFORMING TO AASHTO DESIGNATION M 284M OR M 111 AND M 31M GRADE 400.
2. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 20 mm EXCEPT WHERE NOTED OTHERWISE.
3. COVER TO REINFORCING STEEL SHALL BE 50 mm EXCEPT WHERE NOTED OTHERWISE.
4. ALL CAST-IN-PLACE CONCRETE SHALL BE STRUCTURAL CONCRETE EXCEPT WHERE SPECIFIED OTHERWISE.
5. TYPE II CEMENT (LOW ALKALI) SHALL BE USED.
6. STRUCTURAL STEEL FOR GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M GRADE 250 (ASTM A 709M GRADE 250).
7. A UNIT CATCH BASIN SHALL INCLUDE GRATING, BEARING ANGLES AND BOX COMPLETE.
8. SEE ROADWAY PLANS FOR LOCATION, SIZE AND PAYMENT OF PIPES.
9. GRATING AND BEARING ANGLES SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111 (ASTM A 123).

DESIGN DATA

MS 18 (MS 28-44) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

STRUCTURAL CONCRETE: F'_c = 18 MPa ; F_s (REINF.) = 160 MPa N = 8.

QUANTITIES

SEE SHEET 2 SCHEDULE OF INSTALLATION

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | BY | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL:
CHAIRMAN, STANDARDS COMMITTEE — DATE: MAR 25 1999
APPROVED:
DEPUTY DIRECTOR — DATE: MAR 25 1999

(METRIC)
SHT. 1 OF 2

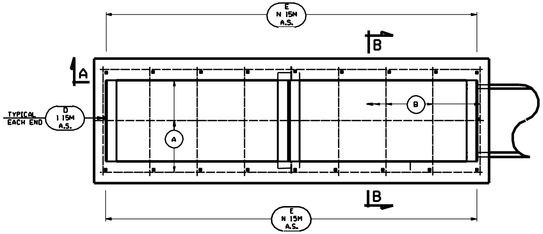
DOUBLE CATCH BASIN

STANDARD DRAWING TITLE

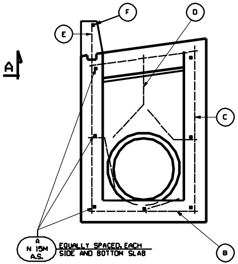
STD. DWG. NO.
1656-1

SCHEDULE OF INSTALLATION

LINE NO	DIMENSIONS				MAXIMUM Ø PIPE DIA.		REINFORCING STEEL												QUANTITIES		
							A		B		C		D		E		F		REINFORCING STEEL	CONCRETE	STRUCTURAL STEEL
	H	W	L	K	RCP	CMP	N	LENGTH	N	LENGTH	N	LENGTH	N	LENGTH	N	LENGTH	N	LENGTH	KILOGRAM	CUBIC METER	KILOGRAM
1	610	510	2372	460	----	381	7	2591	13	737	9	533	2	508	9	610	1	3353	66.5	0.87	269.4
2	762	510	2372	612	305	457	9	2591	15	737	9	686	2	660	9	762	1	3353	80.8	1.20	269.4
3	914	510	2372	764	381	457	9	2591	15	737	9	838	2	813	9	914	1	3353	85.5	1.16	269.4
4	1067	510	2372	917	457	457	11	2591	17	737	9	991	2	965	9	1067	1	3353	100.6	1.31	269.4
5	1219	510	2372	1067	457	457	11	2591	17	737	9	1143	2	1118	9	1219	1	3353	105.3	1.45	269.4



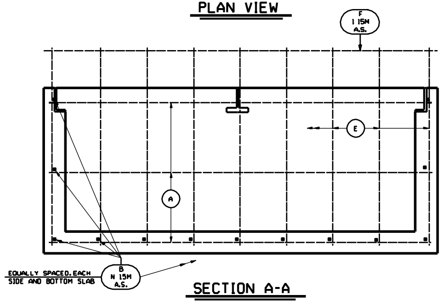
PLAN VIEW



SECTION B-B

TABLE "A"

RCP		CMP	
DIA. (mm)	m^3	DIA. (mm)	m^3
305	.018	305	.011
381	.024	381	.018
457	.031	457	.025



SECTION A-A

GENERAL NOTES

1. CONCRETE QUANTITIES FOR CURB AND GUTTER SHALL BE INCLUDED IN ROADWAY QUANTITIES.
2. CONCRETE DISPLACED BY PIPE(S), TABLE "A", SHALL BE DEDUCTED FROM CONCRETE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION.
3. CUT AND BEND REINFORCING STEEL AS NECESSARY TO CLEAR PIPE(S) AND MAINTAIN 50 mm CLEARANCE.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

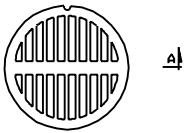
REVISIONS | REMARKS | APPR. | NO.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

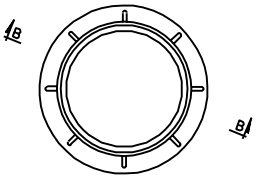
RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 2 OF 2
DOUBLE CATCH BASIN
STANDARD DRAWING TITLE

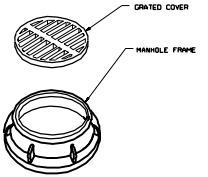
STD. DWG. NO.
1656-2

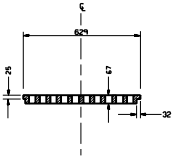


GRATED COVER PLAN

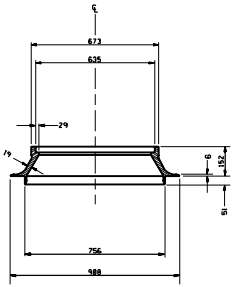


FRAME PLAN





SECTION A-A



SECTION B-B

GENERAL NOTES

1- MANHOLE FRAME AND COVER TO BE FURNISHED IN CAST GRAY IRON CONFORMING TO AASHTO DESIGNATION M 105, CLASS 30B.

2- USE PRECAST CONCRETE GRADE RINGS TO ACHIEVE FINISH GRADE ELEVATION. PRECAST GRADE RINGS ARE FURNISHED IN HEIGHTS OF 102 mm, 152 mm AND 203 mm, TOTAL HEIGHT OF GRADE RINGS NOT TO EXCEED 305 mm. ALL PRECAST GRADE RINGS SHALL CONFORM TO AASHTO DESIGNATION M 199.

3- DIMENSIONS OF GRATE OPENINGS MAY VARY AMONG MANUFACTURERS. CONTRACTOR SHALL SUBMIT SHOP DRAWING FOR APPROVAL PRIOR TO INSTALLATION.

4. ESTIMATED WEIGHT OF FRAME AND COVER 175 Kg.

DESIGN DATA

MS 18 HS 20 OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO	DATE	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
MARJUN 1994
DATE

CHAIRMAN STANDARDS COMMITTEE
APPROVED
MAR 25 1994
DATE

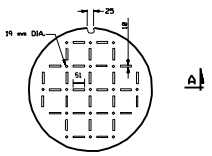
DEPUTY DIRECTOR

(METRIC)
SHT. 1 OF 1

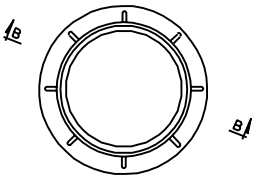
MANHOLE FRAME AND GRATED COVER

STANDARD DRAWING TITLE

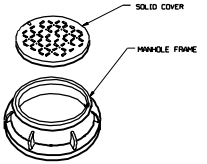
STD. DWG. NO.
1701



SOLID COVER PLAN



FRAME PLAN



GENERAL NOTES

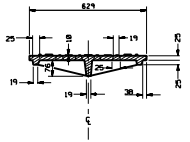
1- MANHOLE FRAME AND COVER TO BE FURNISHED IN CAST GRAY IRON CONFORMING WITH AASHTO DESIGNATION M 105, CLASS 30B.

2- USE PRECAST CONCRETE GRADE RINGS TO ACHIEVE FINISH GRADE ELEVATION. PRECAST GRADE RINGS ARE FURNISHED IN HEIGHTS OF 102 mm, 152 mm AND 203 mm. TOTAL HEIGHT OF GRADE RINGS NOT TO EXCEED 305 mm. ALL PRECAST GRADE RINGS SHALL CONFORM WITH AASHTO DESIGNATION M 199.

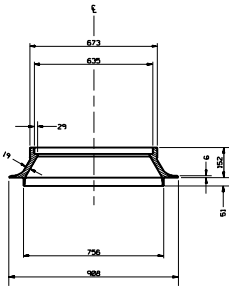
3- ESTIMATED WEIGHT OF FRAME AND COVER 182 Kg.

DESIGN DATA

MS-18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.



SECTION A-A



SECTION B-B

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	REMARKS

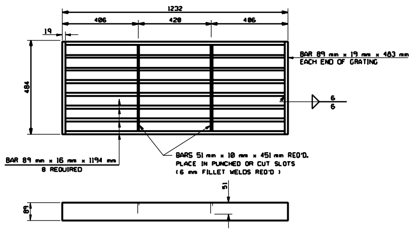
UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MARCH 1999 DATE
APPROVED
DEPUTY DIRECTOR — MARCH 1999 DATE

(METRIC)
SHT. 1 OF 1

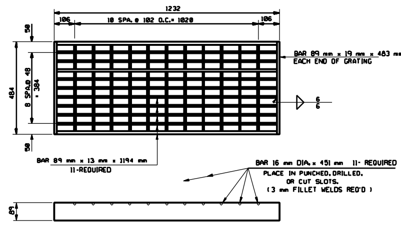
STANDARD DRAWING TITLE
MANHOLE FRAME AND SOLID COVER

STD. DWG. NO.
1702



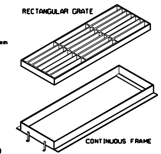
STANDARD GRATING

GRATE WEIGHT: 123 kg



BICYCLE-SAFE GRATING

GRATE WEIGHT: 135 kg



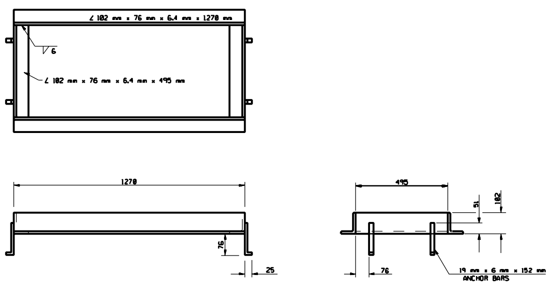
GENERAL NOTES

1. GRATING AND FRAME SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111 (ASTM A 123).
2. STRUCTURAL STEEL GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 (ASTM A 709M GRADE 250).
3. SEE ROADWAY PLANS FOR TYPE OF GRATE REQUIRED.
4. ALL JOINTS REQUIRE 6 mm FILLET WELDS UNLESS NOTED OTHERWISE.

DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

STRUCTURAL STEEL: Fs = 138 MPa.



FRAME

FRAME WEIGHT: 31 kg

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | NO. | APPR.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

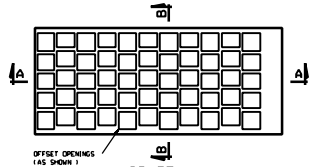
RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 1 OF 1

RECTANGULAR GRATE & FRAME

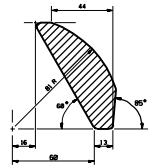
STANDARD DRAWING TITLE

STD. DWG. NO.
1703

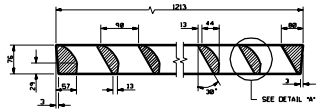


GRATE

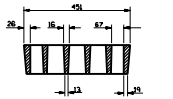
WEIGHT: 121 Kg



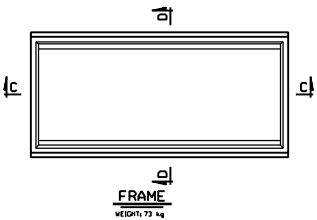
DETAIL "A"



SECTION A-A

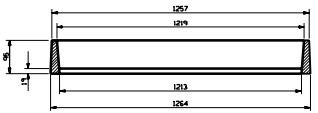


SECTION B-B

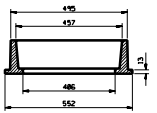


FRAME

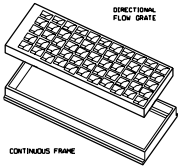
WEIGHT: 73 kg



SECTION C-C



SECTION D-D



GENERAL NOTES

1. GRATE AND FRAME MAY BE FURNISHED IN EITHER DUCTILE IRON (ASTM A 536 GRADE 60) OR CAST GRAY IRON: AASHTO M 105, CLASS 30 B (ASTM A 48).
2. INSTALLATION REQUIRES SUPPORT UNDER LONGITUDINAL AXIS OF FRAME. ORIENT GRATE WITH DIRECTION OF FLOW.

DESIGN DATA

MS 18 (MS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

DUCTILE IRON AND STRUCTURAL STEEL: Fo = 138 MPa.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

NO.	REVISIONS	APPR'D	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: MARCH 1999
DATE

CHAIRMAN STANDARDS COMMITTEE
APPROVED: MARCH 1999
DATE

DEPUTY DIRECTOR

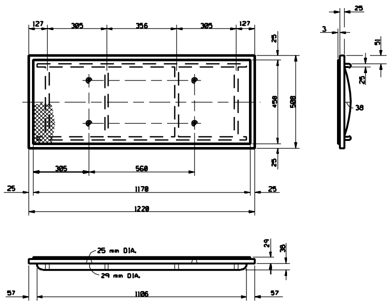
(METRIC)
SHT. 1 OF 1

STANDARD DRAWING TITLE

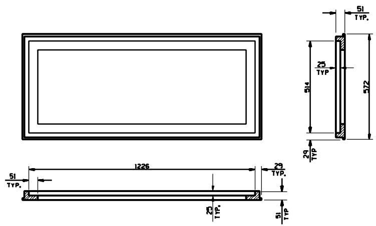
DIRECTIONAL FLOW GRATE & FRAME

STD. DWG. NO.

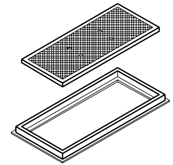
1704



SOLID COVER DETAILS



FRAME DETAILS



GENERAL NOTES

1. SOLID COVER AND FRAME MAY BE FURNISHED IN EITHER DUCTILE IRON (ASTM A 536, GRADE 400) OR CAST GRAY IRON: AASHTO M 105, CLASS 30 B (ASTM A 48).
2. INSTALLATION REQUIRES SUPPORT UNDER LONGITUDINAL AXIS OF FRAME. ORIENT GRATE WITH DIRECTION OF FLOW.

DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

DUCTILE IRON AND STRUCTURAL STEEL: Fs = 138 MPa.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | NO. | DATE | APPR.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

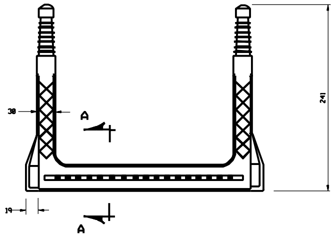
RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 1 OF 1

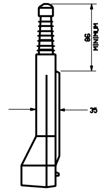
SOLID COVER & FRAME

STANDARD DRAWING TITLE

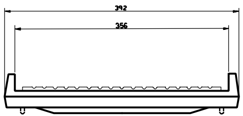
STD. DWG. NO.
1705



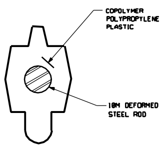
PLAN



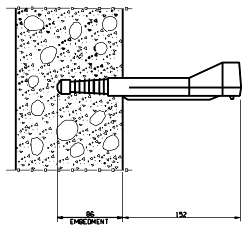
RIGHT SIDE VIEW



END VIEW



SECTION A-A



EMBEDMENT DETAIL

GENERAL NOTES

1. MANHOLE STEPS SHALL BE CAPABLE OF WITHSTANDING A SINGLE CONCENTRATED LOAD OF 136 Kg APPLIED AT A DISTANCE OF 152 mm FROM THE FACE OF THE STRUCTURE WALL.
2. STEPS ARE TO BE VERTICALLY ALIGNED AND UNIFORMLY SPACED WITH A MINIMUM SPACING OF 305 mm AND A MAXIMUM SPACING OF 406 mm UNLESS SHOWN OTHERWISE ON STRUCTURE PLANS.
3. MANHOLE STEPS MAY BE CAST-IN-PLACE, OR GROUTED INTO STRUCTURE WALL IN SUCH A MANNER AS TO PREVENT PULLOUT UNDER A LOAD OF 136 Kg APPLIED 152 mm FROM THE FACE OF THE STRUCTURE WALL.
4. STEEL REINFORCING OF MANHOLE STEPS SHALL CONFORM TO AASHTO DESIGNATION M 31M, GRADE 400, DEFORMED STEEL BAR. PLASTIC COATING OF MANHOLE STEPS SHALL CONFORM TO ASTM DESIGNATION D 2146, TYPE II, GRADE 16906.
5. MANHOLE STEPS SHALL CONFORM TO AASHTO DESIGNATION M 199 UNLESS NOTED OTHERWISE.
6. DIMENSIONS MAY VARY WITH MANUFACTURERS DESIGNS. ALTERNATIVE DESIGNS MAY BE USED WITH THE APPROVAL OF THE PROJECT ENGINEER.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 1 OF 1

MANHOLE STEPS
STANDARD DRAWING TITLE

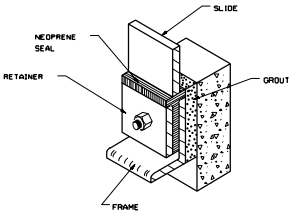
STD. DWG. NO.
1706

STANDARD SCREW GATE SIZES FOR 1524 mm OF HEAD OR LESS

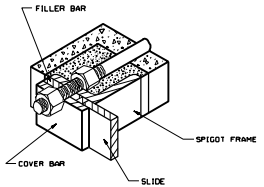
A (mm)	305	381	457	533	610	762	914	1067	1219	1372	1524	1829
B (mm)	305	305	305	533	305	457	610	610	610	762	762	914
	381	381	457		457	610	762	762	762	914	914	1067
	457	457	610		610	762	914	914	914	1067	1067	1219
	610	610	762		762	914	1067	1067	1067	1219	1219	1372
		762	914		914	1067	1219	1219	1219	1372	1372	1524
					1067	1219	1372	1372	1372	1524	1524	1829
					1219		1524	1829	1524	1829	1829	
									1829			

* FRAME HEIGHTS ARE AVAILABLE IN 305 mm INCREMENTS UP TO 3048 mm.

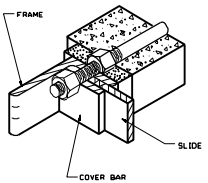
* OPENING SIZE : A X B



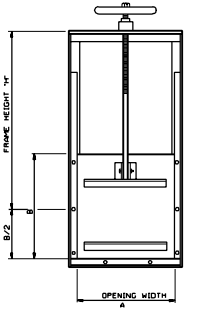
FLUSH BOTTOM CLOSURE



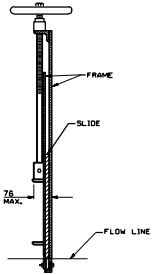
SPIGOT BACK MOUNTING



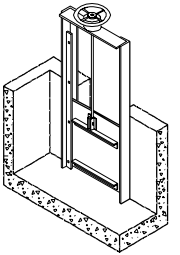
FLAT BACK MOUNTING



FRONT ELEVATION



SECTION THRU



GENERAL NOTES

1- SCREW GATES AND FRAMES SHALL BE DESIGNED FOR A MINIMUM FACE PRESSURE EQUAL TO 1524 mm OF HEAD ABOVE THE GATE OPENING AND ZERO BACK PRESSURE. SCREW GATES ARE INTENDED FOR A MAXIMUM OPENING SIZE OF 1829 mm X 1829 mm.

2- SCREW GATE AND FRAME SHALL BE CONSTRUCTED WITH CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 183M, GRADE 250. OPTIONAL GALVANIZING SHALL BE IN ACCORDANCE WITH AASHTO SPECIFICATION M 111.

3- FRAME SHALL BE MOUNTED USING EITHER FLAT BACK OR SPIGOT BACK DETAILS DEPENDING ON CONDITIONS.

4- IN ALL CASES, SHOP DRAWINGS MUST BE SUBMITTED FOR APPROVAL. SIMILAR SCREW GATES AND FRAMES MAY ALSO BE USED SUBJECT TO THE APPROVAL OF SHOP DRAWINGS.

5- SEE MANUFACTURERS DETAILS FOR FRAME SIZES, AND PLACEMENT OF MOUNTING BOLTS.

DESIGN DATA

STRUCTURAL STEEL: Fs = 138 MPa.
DESIGN SEATING HEAD : 0-1524 mm.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

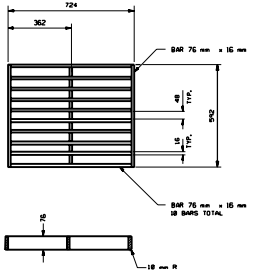
REVISIONS			REMARKS
NO.		DATE	

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MARCH 31, 1995 DATE
APPROVED
DEPUTY DIRECTOR — MARCH 1, 1995 DATE

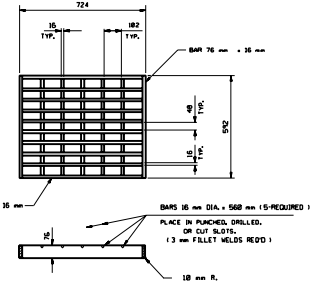
STANDARD DRAWING TITLE
(METRIC)
SHT. 1 OF 1
STANDARD SCREW GATE & FRAME

STD. DWG. NO.
1707



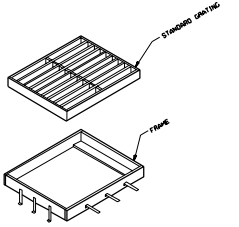
STANDARD GRATE

GRATE WEIGHT = 61 Kg.



BICYCLE-SAFE GRATE

GRATE WEIGHT = 81 Kg.



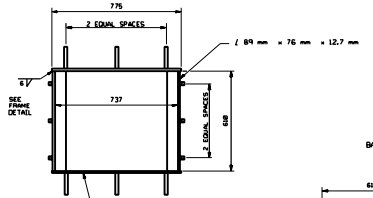
GENERAL NOTES

1. GRATING AND FRAME SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111.
2. STRUCTURAL STEEL GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250.
3. SEE ROADWAY PLANS FOR LOCATION AND NUMBER OF GRATES REQUIRED.
4. WELD ALL JOINTS WITH A 6 mm FILLET WELD UNLESS NOTED OTHERWISE.

DESIGN DATA

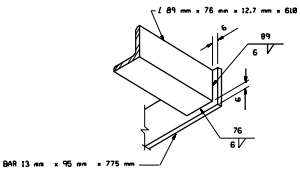
GRATE AND FRAME SHALL MEET MS 18 (MS-18) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH AASHTO SPECIFICATIONS WHICH ARE IN EFFECT AT DATE OF REQUEST FOR BIDS.

STRUCTURAL STEEL: F_s = 138 MPa.

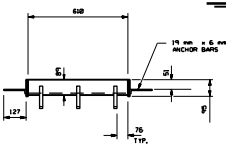


FRAME

FRAME WEIGHT = 35 Kg



FRAME DETAIL



ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			
NO.		DATE	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

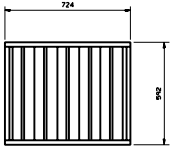
RECOMMENDED FOR APPROVAL — MANAGER, TRAFFIC & SAFETY — MARCH 1999 — DATE
CHAIRMAN, STANDARDS COMMITTEE
APPROVED — DEPUTY DIRECTOR — MARCH 1999 — DATE

(METRIC)
SHT. 1 OF 1

724 mm X 592 mm
GRATE AND FRAME

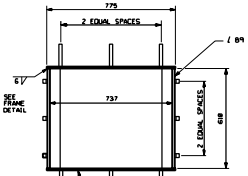
STANDARD DRAWING TITLE

STD. DWG. NO.
1708



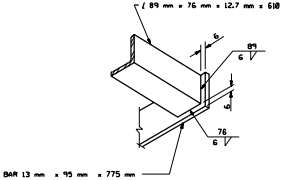
GRATE

GRATE WEIGHT = 186 Kg.

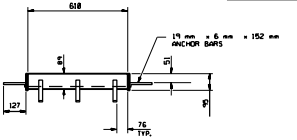


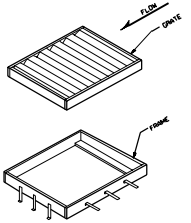
FRAME

FRAME WEIGHT = 35 Kg



FRAME DETAIL





GENERAL NOTES

1. GRATING AND FRAME SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH AASHTO DESIGNATION M 111.
2. STRUCTURAL STEEL GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250.
3. SEE ROADWAY PLANS FOR LOCATION AND NUMBER OF GRATES REQUIRED.
4. WELD ALL JOINTS WITH A 6 mm FILLET WELD UNLESS NOTED OTHERWISE.
5. ORIENT GRATE WITH DIRECTION OF FLOW.

DESIGN DATA

GRATE AND FRAME SHALL MEET MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH AASHTO SPECIFICATIONS WHICH ARE IN EFFECT AT DATE OF REQUEST FOR BIDS.

STRUCTURAL STEEL: F_s = 138 MPa.

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS				
				REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

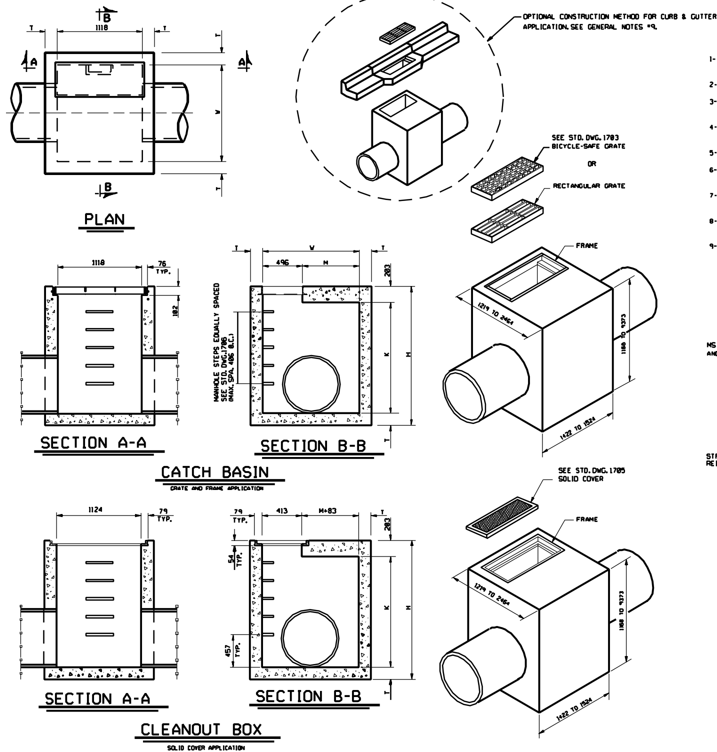
RECOMMENDED FOR APPROVAL — MARCH 1998 — DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MARCH 1998 — DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 1 OF 1

724 mm X 592 mm
DIRECTIONAL FLOW
AND FRAME

STANDARD DRAWING TITLE

STD. DWG. NO.
1709



GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED, DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO DESIGNATION M 31M, GRADE 400.

2- TYPE II CEMENT (LOW ALKALI) SHALL BE USED UNLESS SPECIFIED OTHERWISE.

3- EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 19 mm EXCEPT WHERE NOTED OTHERWISE.

4- ALL CAST-IN-PLACE CONCRETE SHALL BE CONCRETE CLASS AA(AE) EXCEPT WHERE SPECIFIED OTHERWISE.

5- COVER TO REINFORCING STEEL SHALL BE 50 mm EXCEPT WHERE NOTED OTHERWISE.

6- STRUCTURAL STEEL GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 (ASTM A 709M, GRADE 250).

7- SEE STANDARD DRAWINGS 1703 AND 1705 FOR GRATING, FRAME AND SOLID COVER DETAILS.

8- SEE ROADWAY PLANS FOR DETAILS OF INSTALLATION, INCLUDING LOCATION OF UNITS, NUMBER OF UNITS REQUIRED, TYPE OF UNITS, SIZE AND LOCATION OF PIPE(S).

9- FOR CURB & GUTTER APPLICATIONS ADJUST FINISH GRADE ELEVATION OF BOX AS REQUIRED. CONCRETE QUANTITIES FOR CURB & GUTTER SHALL BE INCLUDED IN ROADWAY QUANTITIES.

DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

CAST-IN-PLACE STRUCTURAL CONCRETE: Fc = 10 MPa, N = 8
REINF. STEEL: Fc = 160 MPa
STRUCTURAL STEEL: Fs = 138 MPa.

QUANTITIES

STRUCTURAL CONCRETE
REINFORCING STEEL } SEE SCHEDULE OF INSTALLATION

INDEX OF SHEETS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

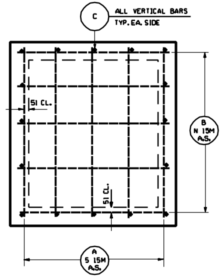
REVISIONS | REMARKS | NO. | CBD | APPR.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

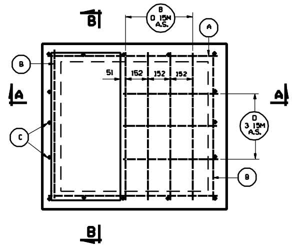
RECOMMENDED FOR APPROVAL — MAR. 09, 1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
DEPUTY DIRECTOR — MAR. 09, 1999 DATE

(METRIC)
SHT. 1 OF 4
STANDARD CATCH BASIN AND CLEANOUT BOX SITUATION & LAYOUT
STANDARD DRAWING TITLE

STD. DWG. NO.
1710-1



PLAN BOTTOM SLAB



PLAN TOP SLAB

GENERAL NOTES

1- THE BOTTOM SLAB OF THE BOX SHALL BE FORMED TO FIT THE INVERT OF THE PIPE(S) WHEN SO REQUIRED ACCORDING TO THE DETAIL SHOWN ON THIS SHEET. SEE TABLE 3 ON SHEET 3 AND 4 FOR ADDITIONAL CONCRETE QUANTITES.

2- CONCRETE DISPLACED BY PIPE(S) SHALL BE DEDUCTED FROM THOSE CONCRETE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION TABLE 1 ON SHEET 3 AND 4.

3- WHEN FORMED INVERT IS REQUIRED, SEE TABLE 3 ON SHEET 3 AND 4 FOR ADDITIONAL CONCRETE QUANTITIES.

4- FIELD CUT AND BEND REINFORCING STEEL AS NECESSARY TO CLEAR PIPE(S) AND MAINTAIN 51 mm MINIMUM CLEARANCE.

5- UNLESS OTHERWISE SHOWN, ALL DIMENSIONS ARE OUT TO OUT OF BARS.

6- WEIGHT QUANTITES FOR GRATE AND FRAME AND SOLID COVER AND FRAME ARE SHOWN FOR INFORMATION ONLY.

7- SEE SHEET 1 FOR DIMENSIONS.

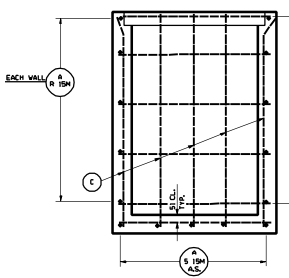
8- PIPE DIAMETERS SHOWN IN TABLES AND SCHEDULE ARE INSIDE DIAMETERS.

9- MAXIMUM PIPE DIMENSIONS SHOWN IN SCHEDULE OF INSTALLATION ARE FOR PIPES PERPENDICULAR TO WALLS OF BOX. CLEARANCES SHOULD BE DETERMINED FOR SKEWED PIPES.

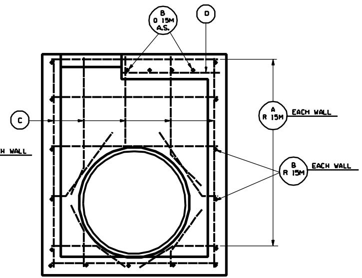
10- SEE STANDARD DRAWING 1706 FOR MANHOLE STEP DETAILS.

11- ALL REINFORCING BARS TO BE 15M BARS @ 305 mm UNLESS OTHERWISE SHOWN.

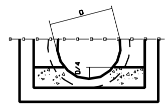
12- WHEN SOLID COVER IS REQUIRED, ADD 0.018 m^3 OF CONCRETE TO THOSE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION AND ADD 76 mm TO EACH D-BAR, AND 0.4536 kg TO REINFORCING STEEL QUANTITIES.



SECTION B-B



SECTION A-A



FORMED INVERT

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

REMARKS

NO. | DATE | APPR.

UTAH DEPARTMENT OF TRANSPORTATION

STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION

SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL: CHAIRMAN STANDARDS COMMITTEE — DATE MAR.09,1999

APPROVED: DEPUTY DIRECTOR — DATE MAR.09,1999

STANDARD CATCH BASIN AND CLEANOUT BOX SECTION DETAILS

(METRIC) SHT. 2 OF 4

STANDARD DRAWING TITLE

STD. DWG. NO.

1710-2

COLUMN "A"

LINE	NO. of MANHOLE STEPS	R	H	K	T	A	A (No.)	B	B (No.)	C NO.#16	D NO.#13	CONC. m^3	REINF. STEEL Kg
			DIMENSIONS			REINFORCING STEEL						QUANTITIES	
1	--	4	1168	813	152	1118	13	1321	16	1041	457	1.08	83
2	2	4	1321	965			13		16	1194		1.18	87
3	2	5	1473	1118			15		18	1346		1.29	98
4	3	5	1626	1270			15		18	1499		1.40	102
5	3	6	1778	1422			17		20	1651		1.51	113
6	4	6	1930	1575			17		20	1803		1.62	117
7	4	7	2083	1727			19		22	1956		1.73	129
8	5	7	2235	1880			19		22	2108		1.84	132
9	5	8	2388	2032			21		24	2261		1.94	144
10	6	8	2540	2184			21		24	2413		2.05	148
11	6	9	2692	2337			23		26	2565		2.16	159
12	7	9	2845	2489			23		26	2718		2.27	163
13	7	10	2997	2642			25		28	2870		2.38	174
14	8	10	3150	2794			25		28	3023		2.49	178
15	8	11	3302	2946			27		30	3175		2.60	189
16	9	11	3454	3099			27		30	3327		2.70	193
17	9	12	3607	3251			29		32	3480		2.81	205
18	10	12	3759	3404	152	1118	29	1321	32	3632	457	2.92	208
19	10	13	3937	3556	178	1168	31	1372	34	3810	483	3.61	225
20	11	13	4089	3708			31		34	3962		3.74	229
21	11	14	4242	3861			33		36	4115		3.87	241
22	12	14	4394	4013			33		36	4267		4.00	244
23	12	15	4547	4166			35		38	4420		4.13	256
24	13	15	4699	4318			35		38	4572		4.26	260
25	13	16	4851	4470			37		40	4724		4.39	272
26	14	16	5004	4623			37		40	4877		4.52	276
27	14	17	5156	4775			39		42	5029		4.65	287
28	15	17	5309	4928			39		42	5182		4.78	291
29	15	18	5461	5080			41		44	5334		4.91	303
30	16	18	5613	5232			41		44	5486		5.04	307
31	16	19	5766	5385			43		46	5639		5.16	318
32	17	19	5918	5537			43		46	5791		5.29	322
33	17	20	6071	5690			45		48	5944		5.42	334
34	18	20	6223	5842			45		48	6096		5.55	337
35	18	21	6375	5994			47		50	6248		5.68	349
36	19	21	6528	6147			47		50	6401		5.81	353
37	19	22	6680	6299			49		52	6553		5.94	365
38	20	22	6833	6452	178	1168	49	1372	52	6706	483	6.07	368
39	20	23	7010	6604	203	1219	51	1422	54	6883	508	7.24	389
40	21	23	7163	6756			51		54	7036		7.39	393
41	21	24	7315	6909			53		56	7188		7.54	405
42	22	24	7468	7061			53		56	7341		7.70	409
43	22	25	7620	7214			55		58	7493		7.85	420
44	23	25	7772	7366			55		58	7645		8.00	425
45	23	26	7925	7518			57		60	7798		8.15	436
46	24	26	8077	7671			57		60	7950		8.30	440
47	24	27	8230	7823			59		62	8103		8.45	452
48	25	27	8382	7976			59		62	8255		8.60	456
49	25	28	8534	8128			61		64	8407		8.75	468
50	26	28	8687	8280			61		64	8560		8.90	472
51	26	29	8839	8433			63		66	8712		9.05	484
52	27	29	8992	8585			63		66	8865		9.21	488
53	27	30	9144	8738			65		68	9017		9.36	499
54	28	30	9296	8890	203	1219	65	1422	68	9169	508	9.51	503
			W:914, M:419										N:5, O:3

COLUMN "B"

LINE	H	K	T	A	A (No.)	B	B (No.)	C NO.#16	D NO.#13	CONC. m^3	REINF. STEEL Kg
	DIMENSIONS			REINFORCING STEEL						QUANTITIES	
1	----	----	---	----	--	----	--	----	---	----	----
2	1346	991	152	1270	13	1321	17	1219	610	1.32	93
3	1499	1143			15		19	1372		1.44	105
4	1651	1295			15		19	1524		1.56	109
5	1803	1448			17		21	1676		1.67	121
6	1956	1600			17		21	1829		1.79	125
7	2108	1753			19		23	1981		1.90	137
8	2261	1905			19		23	2134		2.02	141
9	2413	2057			21		25	2286		2.13	152
10	2565	2210			21		25	2438		2.25	156
11	2718	2362			23		27	2591		2.36	168
12	2870	2515			23		27	2743		2.48	171
13	3023	2667			25		29	2896		2.59	184
14	3175	2819			25		29	3048		2.71	187
15	3327	2972			27		31	3200		2.83	199
16	3480	3124			27		31	3353		2.94	203
17	3632	3277			29		33	3505		3.06	215
18	3810	3429	152	1270	29	1321	33	3658	610	3.17	218
19	3962	3581	178	1321	31	1372	35	3835	635	3.91	236
20	4115	3734			31		35	3988		4.05	240
21	4267	3886			33		37	4140		4.19	252
22	4420	4039			33		37	4293		4.33	256
23	4572	4191			35		39	4445		4.46	268
24	4724	4343			35		39	4597		4.60	272
25	4877	4496			37		41	4750		4.74	284
26	5029	4648			37		41	4902		4.88	288
27	5182	4801			39		43	5055		5.01	300
28	5334	4953			39		43	5207		5.15	303
29	5486	5105			41		45	5359		5.29	316
30	5639	5258			41		45	5512		5.43	319
31	5791	5410			43		47	5664		5.56	332
32	5944	5563			43		47	5817		5.70	336
33	6096	5715			45		49	5969		5.84	347
34	6248	5867			45		49	6121		5.98	352
35	6401	6020			47		51	6274		6.19	363
36	6553	6172			47		51	6426		6.25	367
37	6706	6325			49		53	6579		6.39	380
38	6858	6477	178	1321	49	1372	53	6731	635	6.53	383
39	7036	6629	203	1372	51	1422	55	6909	660	7.77	405
40	7188	6782			51		55	7061		7.93	408
41	7341	6934			53		57	7214		8.09	421
42	7493	7087			53		57	7366		8.25	425
43	7645	7239			55		59	7518		8.41	437
44	7798	7391			55		59	7671		8.58	441
45	7950	7544			57		61	7823		8.74	454
46	8103	7696			57		61	7976		8.90	457
47	8255	7849			59		63	8128		9.06	469
48	8407	8001			59		63	8280		9.22	473
49	8560	8153			61		65	8433		9.38	486
50	8712	8306			61		65	8585		9.54	489
51	8865	8458			63		67	8738		9.70	502
52	9017	8611			63		67	8890		9.86	506
53	9169	8763			65		69	9042		10.02	518
54	9322	8915	203	1372	65	1422	69	9195	660	10.18	522
	W:1067, M:572										N:5, O:4

COLUMN "C"

LINE	H	K	T	A	A (No.)	B	B (No.)	C NO.#18	D NO.#13	CONC. m^3	REINF. STEEL Kg
	DIMENSIONS			REINFORCING STEEL						QUANTITIES	
1	----	----	---	----	--	----	--	----	---	----	----
2	----	----	---	----	--	----	--	----	---	----	----
3	1524	1168	152	1422	15	1321	21	1397	762	1.59	119
4	1676	1321			15		21	1549		1.71	123
5	1829	1473			17		23	1702		1.84	136
6	1981	1626			17		23	1854		1.96	140
7	2134	1778			19		25	2007		2.08	153
8	2286	1930			19		25	2159		2.21	157
9	2438	2083			21		27	2311		2.33	170
10	2591	2235			21		27	2464		2.45	174
11	2743	2388			23		29	2616		2.58	187
12	2896	2540			23		29	2769		2.70	191
13	3048	2692			25		31	2921		2.82	204
14	3200	2845			25		31	3073		2.95	208
15	3353	2997			27		33	3226		3.07	221
16	3505	3150			27		33	3378		3.19	225
17	3658	3302			29		35	3531		3.32	238
18	3810	3454	152	1422	29	1321	35	3683	762	3.44	242
19	3988	3607	178	1473	31	1372	37	3861	787	4.22	261
20	4140	3759			31		37	4013		4.36	265
21	4293	3912			33		39	4166		4.51	278
22	4445	4064			33		39	4318		4.66	282
23	4597	4216			35		41	4470		4.80	295
24	4750	4369			35		41	4623		4.95	300
25	4902	4521			37		43	4775		5.09	313
26	5055	4674			37		43	4928		5.24	318
27	5207	4826			39		45	5080		5.39	331
28	5359	4978			39		45	5232		5.53	335
29	5512	5131			41		47	5385		5.68	348
30	5664	5283			41		47	5537		5.82	352
31	5817	5436			43		49	5690		5.97	365
32	5969	5588			43		49	5842		6.11	370
33	6121	5740			45		51	5994		6.26	383
34	6274	5893			45		51	6147		6.41	387
35	6426	6045			47		53	6299		6.55	400
36	6579	6198			47		53	6452		6.70	404
37	6731	6350			49		55	6604		6.85	417
38	6883	6502	178	1473	49	1372	55	6756	787	6.99	421
39	7061	6655	203	1524	51	1422	57	6934	813	8.31	444
40	7214	6807			51		57	7087		8.48	448
41	7366	6960			53		59	7239		8.64	462
42	7518	7112			53		59	7391		8.81	466
43	7671	7264			55		61	7544		8.98	479
44	7823	7417			55		61	7696		9.15	484
45	7976	7569			57		63	7849		9.32	497
46	8128	7722			57		63	8001		9.49	501
47	8280	7874			59		65	8153		9.66	515
48	8433	8026			59		65	8306		9.83	519
49	8585	8179			61		67	8458		10.00	533
50	8738	8331			61		67	8611		10.17	537
51	8890	8484			63		69	8763		10.34	550
52	9042	8636			63		69	8915		10.51	554
53	9195	8788			65		71	9068		10.68	567
54	9347	8941	203	1524	65	1422	71	9220	813	10.85	572
	W:1219, M:724										N:6, O:5

COLUMN "D"

LINE	H	K	T	A	A (No.)	B	B (No.)	C NO.#18	D NO.#13	CONC. m^3	REINF. STEEL Kg
	DIMENSIONS			REINFORCING STEEL						QUANTITIES	
1	----	----	---	----	--	----	--	----	---	----	----
2	----	----	---	----	--	----	--	----	---	----	----
3	----	----	---	----	--	----	--	----	---	----	----
4	1702	1346	152	1575	15	1321	22	1575	914	1.87	130
5	1854	1499			17		24	1727		2.00	143
6	2007	1651			17		24	1880		2.13	147
7	2159	1803			19		26	2032		2.26	161
8	2311	1956			19		26	2184		2.39	165
9	2464	2108			21		28	2337		2.52	178
10	2616	2261			21		28	2489		2.65	182
11	2769	2413			23		30	2642		2.78	196
12	2921	2565			23		30	2794		2.91	200
13	3073	2718			25		32	2946		3.04	213
14	3226	2870			25		32	3099		3.17	218
15	3378	3023			27		34	3251		3.30	231
16	3531	3175			27		34	3404		3.43	235
17	3683	3327			29		36	3556		3.56	248
18	3835	3480	152	1575	29	1321	36	3708	914	3.69	253
19	4013	3632	178	1626	31	1372	38	3886	940	4.52	272
20	4166	3785			31		38	4039		4.68	276
21	4318	3937			33		40	4191		4.83	290
22	4470	4089			33		40	4343		4.99	294
23	4623	4242			35		42	4496		5.14	308
24	4775	4394			35		42	4648		5.30	312
25	4928	4547			37		44	4801		5.45	326
26	5080	4699			37		44	4953		5.60	330
27	5232	4851			39		46	5105		5.76	343
28	5385	5004			39		46	5258		5.91	347
29	5537	5156			41		48	5410		6.07	361
30	5690	5309			41		48	5563		6.22	366
31	5842	5461			43		50	5715		6.38	379
32	5994	5613			43		50	5867		6.53	383
33	6147	5766			45		52	6020		6.69	397
34	6299	5918			45		52	6172		6.84	401
35	6452	6071			47		54	6325		6.99	415
36	6604	6223			47		54	6477		7.15	419
37	6756	6375			49		56	6629		7.30	432
38	6909	6528	178	1626	49	1372	56	6782	940	7.46	436
39	7087	6680	203	1676	51	1422	58	6960	965	8.84	459
40	7239	6833			51		58	7112		9.02	464
41	7391	6985			53		60	7264		9.20	478
42	7544	7137			53		60	7417		9.38	482
43	7696	7290			55		62	7569		9.56	496
44	7849	7442			55		62	7722		9.74	500
45	8001	7595			57		64	7874		9.92	514
46	8153	7747			57		64	8026		10.10	518
47	8306	7899			59		66	8179		10.28	532
48	8458	8052			59		66	8331		10.46	537
49	8611	8204			61		68	8484		10.64	550
50	8763	8357			61		68	8636		10.82	555
51	8915	8509			63		70	8788		11.00	568
52	9068	8661			63		70	8941		11.18	573
53	9220	8814			65		72	9093		11.36	586
54	9373	8966	203	1676	65	1422	72	9246	965	11.54	591
	W:1372, M:876										N:6, O:6

TABLE 1 : CONCRETE DISPLACED BY PIPES

PIPE SIZES RCP	PIPE SIZES CMP	T=152 m^3	T=178 m^3	T=203 m^3
	300	0.011	0.013	0.015
	450	0.025	0.029	0.034
450	600	0.044	0.052	0.060
600	750	0.070	0.081	0.093
750	900	0.100	0.117	0.133
900	1050	0.136	0.159	0.181
1050	1200	0.178	0.207	0.237

TABLE 2 : MAXIMUM PIPE SIZE TO BE USED

	RCP	CMP
COL. A	450	300, 450, 600
COL. B	600, 750	750, 900
COL. C	900	1050
COL. D	1050	1200

TABLE 3 : CONCRETE NEEDED FOR FORMED INVERT. (SEE SHEET 2)

PIPE SIZES	300	450	600	750	900	1050	1200
RCP (m^3)	-----	0.146	0.170	0.219	0.289	0.369	-----
CMP (m^3)	0.062	0.081	0.092	0.095	0.129	0.168	0.212

STRUCTURAL STEEL :

RECTANGULAR GRATE & FRAME : 154 Kg
BICYCLE-SAFE GRATE & FRAME = 166 Kg
SOLID COVER & FRAME = 215 Kg

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | NO. | [symbol] | APPR. | REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT. 3 OF 4
STANDARD CATCH BASIN AND CLEANOUT BOX
SCHEDULE OF INSTALLATION
450-1050 RCP 300-1200 CMP
STANDARD DRAWING TITLE

STD. DWG. NO.
1710-3

COLUMN "E"

LINE	NO. of MANHOLE STEPS	R	DIMENSIONS H	DIMENSIONS K	DIMENSIONS T	REINFORCING STEEL A LENGTH	A NO	B LENGTH	B NO	C NO.20 LENGTH	D NO.3 LENGTH	QUANTITIES CONC. m³	REINF. STEEL Kg
1	4	6	*1930	1575	152	1803	17	1321	26	1803	1143	2.29	162
2	4	7	2083	1727			19		28	1956		2.43	176
3	5	7	2235	1880			19		28	2108		2.58	181
4	5	8	2388	2032			21		30	2261		2.72	196
5	6	8	2540	2184			21		30	2413		2.86	200
6	6	9	2692	2337			23		32	2565		3.00	215
7	7	9	2845	2489			23		32	2718		3.14	220
8	7	10	2997	2642			25		34	2870		3.28	234
9	8	10	3150	2794			25		34	3023		3.42	239
10	8	11	3302	2946			27		36	3175		3.56	253
11	9	11	3454	3099			27		36	3327		3.70	258
12	9	12	3607	3251			29		38	3480		3.84	273
13	10	12	3759	3404	152	1803	29	1321	38	3632	1143	3.98	277
14	10	13	3937	3556	178	1854	31	1372	40	3810	1168	4.06	298
15	11	13	4089	3708			31		40	3962		5.03	303
16	11	14	4242	3861			33		42	4115		5.20	318
17	12	14	4394	4013			33		42	4267		5.36	323
18	12	15	4547	4166			35		44	4420		5.53	337
19	13	15	4699	4318			35		44	4572		5.70	342
20	13	16	4851	4470			37		46	4724		5.86	357
21	14	16	5004	4623			37		46	4877		6.03	361
22	14	17	5156	4775			39		48	5029		6.20	376
23	15	17	5309	4928			39		48	5182		6.36	381
24	15	18	5461	5080			41		50	5334		6.53	396
25	16	18	5613	5232			41		50	5486		6.70	400
26	16	19	5766	5385			43		52	5639		6.86	415
27	17	19	5918	5537			43		52	5791		7.03	420
28	17	20	6071	5690			45		54	5944		7.20	435
29	18	20	6223	5842			45		54	6096		7.36	439
30	18	21	6375	5994			47		56	6248		7.53	454
31	19	21	6528	6147			47		56	6401		7.70	459
32	19	22	6680	6299			49		58	6553		7.86	474
33	20	22	6833	6452	178	1854	49	1372	58	6706	1168	8.03	478
34	20	23	7010	6604	203	1905	51	1422	60	6883	1194	9.51	503
35	21	23	7163	6756			51		60	7036		9.70	507
36	21	24	7315	6909			53		62	7188		9.89	522
37	22	24	7468	7061			53		62	7341		10.09	527
38	22	25	7620	7214			55		64	7493		10.28	542
39	23	25	7772	7366			55		64	7645		10.48	547
40	23	26	7925	7518			57		66	7798		10.67	562
41	24	26	8077	7671			57		66	7950		10.86	567
42	24	27	8230	7823			59		68	8103		11.06	582
43	25	27	8382	7976			59		68	8255		11.25	586
44	25	28	8534	8128			61		70	8407		11.44	601
45	26	28	8687	8280			61		70	8560		11.64	606
46	26	29	8839	8433			63		72	8712		11.83	621
47	27	29	8992	8585			63		72	8865		12.02	626
48	27	30	9144	8738			65		74	9017		12.22	641
49	28	30	9296	8890	203	1905	65	1422	74	9169	1194	12.41	646
			W:1600, M:1105										N:7, O:7

COLUMN "F"

LINE	DIMENSIONS H	DIMENSIONS K	DIMENSIONS T	REINFORCING STEEL A LENGTH	A NO	B LENGTH	B NO	C NO.20 LENGTH	D NO.3 LENGTH	QUANTITIES CONC. m³	REINF. STEEL Kg
1	----	----	---	----	--	----	--	----	---	----	----
2	*2083	1727	152	1956	19	1321	29	1956	1295	2.59	184
3	2235	1880			19		29	2108		2.74	189
4	2388	2032			21		31	2261		2.89	204
5	2540	2184			21		31	2413		3.04	208
6	2692	2337			23		33	2565		3.18	223
7	2845	2489			23		33	2718		3.33	228
8	2997	2642			25		35	2870		3.48	243
9	3150	2794			25		35	3023		3.62	248
10	3302	2946			27		37	3175		3.77	263
11	3454	3099			27		37	3327		3.92	267
12	3607	3251			29		39	3480		4.07	282
13	3759	3404	152	1956	29	1321	39	3632	1295	4.21	287
14	3937	3556	178	2007	31	1372	41	3810	1321	5.14	308
15	4089	3708			31		41	3962		5.32	313
16	4242	3861			33		43	4115		5.49	328
17	4394	4013			33		43	4267		5.67	333
18	4547	4166			35		45	4420		5.84	348
19	4699	4318			35		45	4572		6.02	353
20	4851	4470			37		47	4724		6.19	368
21	5004	4623			37		47	4877		6.37	373
22	5156	4775			39		49	5029		6.54	388
23	5309	4928			39		49	5182		6.72	393
24	5461	5080			41		51	5334		6.89	408
25	5613	5232			41		51	5486		7.07	413
26	5766	5385			43		53	5639		7.24	428
27	5918	5537			43		53	5791		7.41	433
28	6071	5690			45		55	5944		7.59	448
29	6223	5842			45		55	6096		7.76	453
30	6375	5994			47		57	6248		7.94	468
31	6528	6147			47		57	6401		8.11	473
32	6680	6299			49		59	6553		8.29	488
33	6833	6452	178	2007	49	1372	59	6706	1321	8.46	493
34	7010	6604	203	2057	51	1422	61	6883	1346	10.01	518
35	7163	6756			51		61	7036		10.21	522
36	7315	6909			53		63	7188		10.42	538
37	7468	7061			53		63	7341		10.62	542
38	7620	7214			55		65	7493		10.82	558
39	7772	7366			55		65	7645		11.03	563
40	7925	7518			57		67	7798		11.23	578
41	8077	7671			57		67	7950		11.43	583
42	8230	7823			59		69	8103		11.63	599
43	8382	7976			59		69	8255		11.84	603
44	8534	8128			61		71	8407		12.04	619
45	8687	8280			61		71	8560		12.24	624
46	8839	8433			63		73	8712		12.45	639
47	8992	8585			63		73	8865		12.65	644
48	9144	8738			65		75	9017		12.85	660
49	9296	8890	203	2057	65	1422	75	9169	1346	13.05	670
	W:1753, M:1257										N:7, O:8

COLUMN "G"

LINE	DIMENSIONS H	DIMENSIONS K	DIMENSIONS T	REINFORCING STEEL A LENGTH	A NO	B LENGTH	B NO	C NO.22 LENGTH	D NO.3 LENGTH	QUANTITIES CONC. m³	REINF. STEEL Kg
1	----	----	---	----	--	----	--	----	---	----	----
2	----	----	---	----	--	----	--	----	---	----	----
3	*2235	1880	152	2108	19	1321	31	2108	1448	2.90	205
4	2388	2032			21		33	2261		3.06	220
5	2540	2184			21		33	2413		3.21	225
6	2692	2337			23		35	2565		3.37	241
7	2845	2489			23		35	2718		3.52	247
8	2997	2642			25		37	2870		3.68	263
9	3150	2794			25		37	3023		3.83	268
10	3302	2946			27		39	3175		3.99	283
11	3454	3099			27		39	3327		4.14	288
12	3607	3251			29		41	3480		4.29	304
13	3759	3404	152	2108	29	1321	41	3632	1448	4.45	310
14	3937	3556	178	2159	31	1372	43	3810	1473	5.42	332
15	4089	3708			31		43	3962		5.60	337
16	4242	3861			33		45	4115		5.79	354
17	4394	4013			33		45	4267		5.97	359
18	4547	4166			35		47	4420		6.15	375
19	4699	4318			35		47	4572		6.34	380
20	4851	4470			37		49	4724		6.52	396
21	5004	4623			37		49	4877		6.70	402
22	5156	4775			39		51	5029		6.88	418
23	5309	4928			39		51	5182		7.07	423
24	5461	5080			41		53	5334		7.25	439
25	5613	5232			41		53	5486		7.43	445
26	5766	5385			43		55	5639		7.62	460
27	5918	5537			43		55	5791		7.80	466
28	6071	5690			45		57	5944		7.98	482
29	6223	5842			45		57	6096		8.17	487
30	6375	5994			47		59	6248		8.35	503
31	6528	6147			47		59	6401		8.53	508
32	6680	6299			49		61	6553		8.72	525
33	6833	6452	178	2159	49	1372	61	6706	1473	8.90	530
34	7010	6604	203	2210	51	1422	63	6883	1499	10.51	556
35	7163	6756			51		63	7036		10.73	561
36	7315	6909			53		65	7188		10.94	578
37	7468	7061			53		65	7341		11.15	583
38	7620	7214			55		67	7493		11.36	599
39	7772	7366			55		67	7645		11.57	605
40	7925	7518			57		69	7798		11.79	621
41	8077	7671			57		69	7950		12.00	626
42	8230	7823			59		71	8103		12.21	643
43	8382	7976			59		71	8255		12.42	648
44	8534	8128			61		73	8407		12.64	665
45	8687	8280			61		73	8560		12.85	670
46	8839	8433			63		75	8712		13.06	686
47	8992	8585			63		75	8865		13.27	691
48	9144	8738			65		77	9017		13.49	708
49	9296	8890	203	2210	65	1422	77	9169	1499	13.70	713
	W:1905, M:1410										N:8, O:9

COLUMN "H"

LINE	DIMENSIONS H	DIMENSIONS K	DIMENSIONS T	REINFORCING STEEL A LENGTH	A NO	B LENGTH	B NO	C NO.22 LENGTH	D NO.3 LENGTH	QUANTITIES CONC. m³	REINF. STEEL Kg
1	----	----	---	----	--	----	--	----	---	----	----
2	----	----	---	----	--	----	--	----	---	----	----
3	----	----	---	----	--	----	--	----	---	----	----
4	*2464	2108	152	2261	21	1321	34	2337	1600	3.31	230
5	2616	2261			21		34	2489		3.47	236
6	2769	2413			23		36	2642		3.63	252
7	2921	2565			23		36	2794		3.80	257
8	3073	2718			25		38	2946		3.96	274
9	3226	2870			25		38	3099		4.12	279
10	3378	3023			27		40	3251		4.28	295
11	3531	3175			27		40	3404		4.44	300
12	3683	3327			29		42	3556		4.60	317
13	3835	3480	152	2261	29	1321	42	3708	1600	4.77	322
14	4013	3632	178	2311	31	1372	44	3886	1626	5.79	345
15	4166	3785			31		44	4039		5.99	350
16	4318	3937			33		46	4191		6.18	367
17	4470	4089			33		46	4343		6.37	372
18	4623	4242			35		48	4496		6.56	389
19	4775	4394			35		48	4648		6.75	394
20	4928	4547			37		50	4801		6.94	411
21	5080	4699			37		50	4953		7.13	416
22	5232	4851			39		52	5105		7.33	433
23	5385	5004			39		52	5258		7.52	438
24	5537	5156			41		54	5410		7.71	454
25	5690	5309			41		54	5563		7.90	459
26	5842	5461			43		56	5715		8.09	476
27	5994	5613			43		56	5867		8.28	481
28	6147	5766			45		58	6020		8.47	498
29	6299	5918			45		58	6172		8.66	503
30	6452	6071			47		60	6325		8.86	520
31	6604	6223			47		60	6477		9.05	525
32	6756	6375			49		62	6629		9.24	542
33	6909	6528	178	2311	49	1372	62	6782	1626	9.43	547
34	7087	6680	203	2362	51	1422	64	6960	1651	11.13	573
35	7239	6833			51		64	7112		11.35	579
36	7391	6985			53		66	7264		11.57	596
37	7544	7137			53		66	7417		11.79	601
38	7696	7290			55		68	7569		12.02	618
39	7849	7442			55		68	7722		12.24	623
40	8001	7595			57		70	7874		12.46	640
41	8153	7747			57		70	8026		12.68	645
42	8306	7899			59		72	8179		12.90	662
43	8458	8052			59		72	8331		13.13	667
44	8611	8204			61		74	8484		13.35	684
45	8763	8357			61		74	8636		13.57	689
46	8915	8509			63		76	8788		13.79	707
47	9068	8661			63		76	8941		14.01	712
48	9220	8814			65		78	9093		14.23	729
49	9373	8966	203	2362	65	1422	78	9246	1651	14.46	734
	W:2057, M:1562										N:8, O:10

NOTE: LINES MARKED WITH * REFER TO METAL PIPE ONLY.

TABLE 1 : CONCRETE DISPLACED BY PIPES

PIPE SIZES RCP	CMP	T=152 m³	T=178 m³	T=203 m³
1200	1500	0.260	0.303	0.346
1350	1650	0.326	0.381	0.435
1500	1800	0.401	0.467	0.534
1650	1950	0.482	0.562	0.642

TABLE 2 : MAXIMUM PIPE SIZE TO BE USED

	RCP	CMP
COL.E	1200	1500
COL.F	1350	1650
COL.G	1500	1800
COL.H	1650	1950

TABLE 3 : CONCRETE NEEDED FOR FORMED INVERT. (SEE SHEET 2)

PIPE SIZES	1200	1350	1500	1650	1800	1950
RCP (m³)	0.517	0.622	0.737	0.861	----	----
CMP (m³)	----	----	0.283	0.339	0.399	0.466

STRUCTURAL STEEL :

RECTANGULAR GRATE & FRAME = 154 Kg
BICYCLE-SAFE GRATE & FRAME = 166 Kg
SOLID COVER & FRAME = 215 Kg

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DESCRIPTION	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

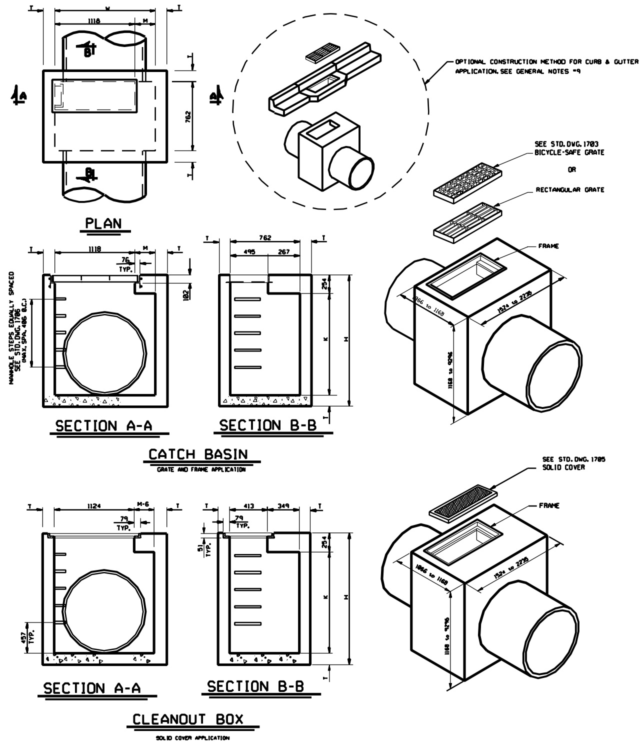
RECOMMENDED FOR APPROVAL — MAR.04,1999 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED
MAR.04,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 4 OF 4

STANDARD CATCH BASIN AND CLEANOUT BOX SCHEDULE OF INSTALLATION 450-1050 RCP 300-1200 CMP

STANDARD DRAWING TITLE

STD. DWG. NO.
1710-4



GENERAL NOTES

1- ALL REINFORCING STEEL SHALL BE COATED, DEFORMED BILLET-STEEL BARS CONFORMING TO AASHTO DESIGNATION M 31M, GRADE 400.

2- TYPE II CEMENT (LOW ALKALI) SHALL BE USED UNLESS SPECIFIED OTHERWISE.

3- EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 19 mm EXCEPT WHERE NOTED OTHERWISE.

4- ALL CAST-IN-PLACE CONCRETE SHALL BE CONCRETE CLASS AA(AE) EXCEPT WHERE SPECIFIED OTHERWISE.

5- COVER TO REINFORCING STEEL SHALL BE 51 mm EXCEPT WHERE NOTED OTHERWISE.

6- STRUCTURAL STEEL GRATING SHALL BE STRUCTURAL CARBON STEEL CONFORMING TO AASHTO DESIGNATION M 270M, GRADE 250 (ASTM A 709M, GRADE 250).

7- SEE STANDARD DRAWINGS 1703 AND 1705 FOR GRATING, FRAME AND SOLID COVER DETAILS.

8- SEE ROADWAY PLANS FOR DETAILS OF INSTALLATION, INCLUDING LOCATION OF UNITS, NUMBER OF UNITS REQUIRED, TYPE OF UNITS, SIZE AND LOCATION OF PIPE(S).

9- FOR CURB & GUTTER APPLICATIONS ADJUST FINISH GRADE ELEVATION OF BOX AS REQUIRED. CONCRETE QUANTITIES FOR CURB & GUTTER SHALL BE INCLUDED IN ROADWAY QUANTITIES.

DESIGN DATA

MS 18 (HS-20) OR INTERSTATE ALTERNATE LOADING IN ACCORDANCE WITH CURRENT AASHTO AND INTERIM SPECIFICATIONS.

CAST-IN-PLACE STRUCTURAL CONCRETE: Fc = 10 MPa, N = 8
REINF. STEEL: Fs = 160 MPa
STRUCTURAL STEEL: Fs = 138 MPa.

QUANTITIES

STRUCTURAL CONCRETE
REINFORCING STEEL } SEE SCHEDULE OF INSTALLATION

INDEX OF SHEETS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	[illegible]	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

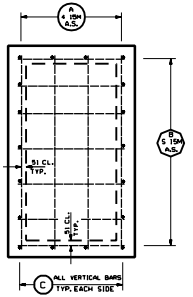
RECOMMENDED FOR APPROVAL — MAR.09,1999 DATE
CHAIRMAN STANDARDS COMMITTEE
APPROVED — MAR.09,1999 DATE
DEPUTY DIRECTOR

(METRIC)
SHT. 1 OF 3

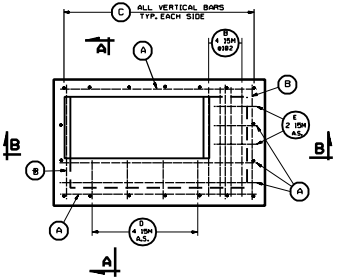
STANDARD CATCH BASIN AND CLEANOUT BOX SITUATION & LAYOUT

STANDARD DRAWING TITLE

STD. DWG. NO.
1711-1



PLAN BOTTOM SLAB



PLAN TOP SLAB

GENERAL NOTES

1- QUANTITIES SHOWN IN THE SCHEDULE OF INSTALLATION ARE FOR ONE UNIT ONLY. EXCAVATION AND BACKFILL COST SHALL BE INCLUDED IN UNIT BID PRICE FOR CONCRETE.

2- SOLID COVER AND FRAME OR GRATE AND FRAME SHALL BE PAID FOR AT THE UNIT BID PRICE PER EACH.

3- THE BOTTOM SLAB OF THE BOX SHALL BE FORMED TO FIT THE INVERT OF THE PIPE(S) WHEN SO REQUIRED ACCORDING TO THE DETAIL SHOWN ON THIS SHEET. SEE TABLE 3 ON SHEET 3 OF 3 FOR ADDITIONAL CONCRETE QUANTITIES.

4- CONCRETE DISPLACED BY PIPE(S) SHALL BE DEDUCTED FROM THOSE CONCRETE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION TABLE 1 ON SHEET 3 OF 3.

5- WHEN FORMED INVERT IS REQUIRED, SEE TABLE 3 ON SHEET 3 OF 3 FOR ADDITIONAL CONCRETE QUANTITIES.

6- FIELD CUT AND BEND REINFORCING STEEL AS NECESSARY TO CLEAR PIPE(S) AND MAINTAIN 51 mm MINIMUM CLEARANCE.

7- UNLESS OTHERWISE SHOWN, ALL DIMENSIONS ARE OUT TO OUT OF BARS.

8- WEIGHT QUANTITIES FOR GRATE AND FRAME, AND SOLID COVER AND FRAME ARE SHOWN FOR INFORMATION ONLY.

9- SEE SHEET 1 FOR DIMENSIONS.

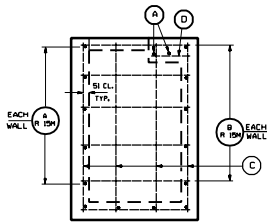
10- PIPE DIAMETERS SHOWN IN TABLES AND SCHEDULE ARE INSIDE DIAMETERS.

11- MAXIMUM PIPE DIMENSIONS SHOWN IN SCHEDULE OF INSTALLATION ARE FOR PIPES PERPENDICULAR TO WALLS OF BOX. CLEARANCES SHOULD BE DETERMINED FOR SKEWED PIPES.

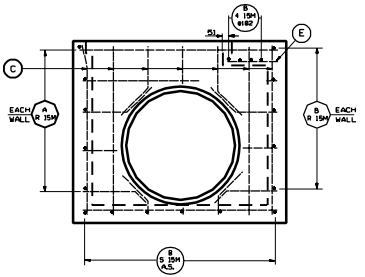
12- SEE STANDARD DRAWING 1706 FOR MANHOLE STEP DETAILS.

13- ALL REINFORCING BARS TO BE 15M BARS @ 305 mm UNLESS OTHERWISE SHOWN.

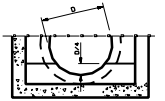
14- WHEN SOLID COVER IS REQUIRED, ADD 0.010 m^3 OF CONCRETE TO THOSE QUANTITIES GIVEN IN SCHEDULE OF INSTALLATION AND ADD 76 mm TO EACH D-BAR, AND 0.453 kg TO REINFORCING STEEL QUANTITIES.



SECTION A-A



SECTION B-B



FORMED INVERT

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS			REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL:
CHAIRMAN, STANDARDS COMMITTEE — DATE: MARCH 15th 1995
APPROVED:
DEPUTY DIRECTOR — DATE: MARCH 15th 1995

(METRIC)
SHT. 2 OF 3

STANDARD CATCH BASIN AND CLEANOUT BOX SECTION DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
1711-2

COLUMN "A"

LINE	NO. of MANHOLE STEPS	R	H	K	T	A LENGTH	A NO	B LENGTH	B NO	C NO.16 LENGTH	D NO.14 LENGTH	CONC. m^3	REINF. STEEL Kg
1	--	4	1168	762	152	1422	14	965	15	1041	305	1.04	81
2	2	4	1321	914			14		15	1194		1.15	85
3	2	5	1473	1067			16		17	1346		1.26	96
4	3	5	1626	1219			16		17	1499		1.36	100
5	3	6	1778	1372			18		19	1651		1.47	111
6	4	6	1930	1524			18		19	1803		1.57	115
7	4	7	2083	1676			20		21	1956		1.68	126
8	5	7	2235	1829			20		21	2108		1.79	130
9	5	8	2388	1981			22		23	2261		1.89	141
10	6	8	2540	2134			22		23	2413		2.00	145
11	6	9	2692	2286			24		25	2565		2.11	156
12	7	9	2845	2438			24		25	2718		2.21	160
13	7	10	2997	2591			26		27	2870		2.32	171
14	8	10	3150	2743			26		27	3023		2.42	175
15	8	11	3302	2896			28		29	3175		2.53	186
16	9	11	3454	3048			28		29	3327		2.64	190
17	9	12	3607	3200			30		31	3480		2.74	201
18	10	12	3759	3353	152	1422	30	965	31	3632	305	2.85	205
19	10	13	3937	3505	178	1473	32	1016	33	3810	330	3.52	222
20	11	13	4089	3658			32		33	3962		3.65	226
21	11	14	4242	3810			34		35	4115		3.78	237
22	12	14	4394	3962			34		35	4267		3.90	241
23	12	15	4547	4115			36		37	4420		4.03	250
24	13	15	4699	4267			36		37	4572		4.16	256
25	13	16	4851	4420			38		39	4724		4.28	268
26	14	16	5004	4572			38		39	4877		4.41	272
27	14	17	5156	4724			40		41	5029		4.54	283
28	15	17	5309	4877			40		41	5182		4.66	287
29	15	18	5461	5029			42		43	5334		4.79	298
30	16	18	5613	5182			42		43	5486		4.92	302
31	16	19	5766	5334			44		45	5639		5.04	314
32	17	19	5918	5486			44		45	5791		5.17	318
33	17	20	6071	5639			46		47	5944		5.30	329
34	18	20	6223	5791			46		47	6096		5.42	333
35	18	21	6375	5944			48		49	6248		5.55	344
36	19	21	6528	6096			48		49	6401		5.68	348
37	19	22	6680	6248			50		51	6553		5.80	360
38	20	22	6833	6401	178	1473	50	1016	51	6706	330	5.93	363
39	20	23	7010	6553	203	1524	52	1067	53	6883	356	7.08	384
40	21	23	7163	6706			52		53	7036		7.23	388
41	21	24	7315	6858			54		55	7188		7.37	400
42	22	24	7468	7010			54		55	7341		7.52	403
43	22	25	7620	7163			56		57	7493		7.67	415
44	23	25	7772	7315			56		57	7645		7.82	419
45	23	26	7925	7468			58		59	7798		7.97	431
46	24	26	8077	7620			58		59	7950		8.11	435
47	24	27	8230	7772			60		61	8103		8.26	446
48	25	27	8382	7925			60		61	8255		8.41	450
49	25	28	8534	8077			62		63	8407		8.56	462
50	26	28	8687	8230			62		63	8560		8.71	466
51	26	29	8839	8382			64		65	8712		8.85	478
52	27	29	8992	8534			64		65	8865		9.00	479
53	27	30	9144	8687			66		67	9017		9.15	493
54	28	30	9296	8839	203	1524	66	1067	67	9169	356	9.30	497
			W=1219, M=102										N=1, S=6

COLUMN "B"

LINE	H	K	T	A LENGTH	A NO	B LENGTH	B NO	C NO.18 LENGTH	D NO.14 LENGTH	E NO.12 LENGTH	CONC. m^3	REINF. STEEL Kg
1	----		---	----	--	---	--	----	---	---	----	----
2	----		---	----	--	---	--	----	---	---	----	----
3	----		---	----	--	---	--	----	---	---	----	----
4	----		---	----	--	---	--	----	---	---	----	----
5	----		---	----	--	---	--	----	---	---	----	----
6	1930	1524	152	1727	18	965	23	1803	305	457	1.85	137
7	2083	1676			20		25	1956			1.97	146
8	2235	1829			20		25	2108			2.09	153
9	2388	1981			22		27	2261			2.21	166
10	2540	2134			22		27	2413			2.33	170
11	2692	2286			24		29	2565			2.45	183
12	2845	2438			24		29	2718			2.57	187
13	2997	2591			26		31	2870			2.69	200
14	3150	2743			26		31	3023			2.81	204
15	3302	2896			28		33	3175			2.93	216
16	3454	3048			28		33	3327			3.05	220
17	3607	3200			30		35	3480			3.17	234
18	3759	3353	152	1727	30	965	35	3632	305	457	3.29	238
19	3937	3505	178	1778	32	1016	37	3810	330	483	4.05	257
20	4089	3658			32		37	3962			4.19	261
21	4242	3810			34		39	4115			4.34	274
22	4394	3962			34		39	4267			4.48	278
23	4547	4115			36		41	4420			4.62	291
24	4699	4267			36		41	4572			4.77	295
25	4851	4420			38		43	4724			4.91	308
26	5004	4572			38		43	4877			5.05	313
27	5156	4724			40		45	5029			5.20	326
28	5309	4877			40		45	5182			5.34	330
29	5461	5029			42		47	5334			5.48	342
30	5613	5182			42		47	5486			5.63	347
31	5766	5334			44		49	5639			5.77	360
32	5918	5486			44		49	5791			5.91	364
33	6071	5639			46		51	5944			6.06	377
34	6223	5791			46		51	6096			6.20	381
35	6375	5944			48		53	6248			6.34	394
36	6528	6096			48		53	6401			6.48	398
37	6680	6248			50		55	6553			6.63	411
38	6833	6401	178	1778	50	1016	55	6706	330	483	6.77	415
39	7010	6553	203	1829	52	1067	57	6883	356	508	8.05	438
40	7163	6706			52		57	7036			8.22	442
41	7315	6858			54		59	7188			8.39	455
42	7468	7010			54		59	7341			8.55	460
43	7620	7163			56		61	7493			8.72	473
44	7772	7315			56		61	7645			8.89	477
45	7925	7468			58		63	7798			9.05	491
46	8077	7620			58		63	7950			9.22	495
47	8230	7772			60		65	8103			9.39	508
48	8382	7925			60		65	8255			9.55	513
49	8534	8077			62		67	8407			9.72	526
50	8687	8230			62		67	8560			9.89	530
51	8839	8382			64		69	8712			10.05	543
52	8992	8534			64		69	8865			10.22	547
53	9144	8687			66		71	9017			10.39	561
54	9296	8839	203	1829	66	1067	71	9169	356	508	10.55	565
	W=1524, M=406											N=4, S=7

COLUMN "C"

LINE	H	K	T	A LENGTH	A NO	B LENGTH	B NO	C NO.18 LENGTH	D NO.14 LENGTH	E NO.12 LENGTH	CONC. m^3	REINF. STEEL Kg
1	----	----	---	----	--	----	--	----	----	----	----	----
2	----	----	---	----	--	----	--	----	----	----	----	----
3	----	----	---	----	--	----	--	----	----	----	----	----
4	----	----	---	----	--	----	--	----	----	----	----	----
5	----	----	---	----	--	----	--	----	----	----	----	----
6	----	----	---	----	--	----	--	----	----	----	----	----
7	2083	1676	152	1880	20	965	26	1956	305	610	2.11	156
8	2235	1829			20		26	2108			2.24	160
9	2388	1981			22		28	2261			2.37	173
10	2540	2134			22		28	2413			2.49	177
11	2692	2286			24		30	2565			2.62	191
12	2845	2438			24		30	2718			2.75	195
13	2997	2591			26		32	2870			2.88	208
14	3150	2743			26		32	3023			3.00	212
15	3302	2896			28		34	3175			3.13	225
16	3454	3048			28		34	3327			3.26	230
17	3607	3200			30		36	3480			3.39	243
18	3759	3353	152	1880	30	965	36	3632	305	610	3.51	247
19	3937	3505	178	1930	32	1016	38	3810	330	635	4.32	266
20	4089	3658			32		38	3962			4.47	270
21	4242	3810			34		40	4115			4.62	284
22	4394	3962			34		40	4267			4.77	288
23	4547	4115			36		42	4420			4.92	302
24	4699	4267			36		42	4572			5.07	306
25	4851	4420			38		44	4724			5.22	319
26	5004	4572			38		44	4877			5.37	323
27	5156	4724			40		46	5029			5.53	337
28	5309	4877			40		46	5182			5.68	341
29	5461	5029			42		48	5334			5.83	355
30	5613	5182			42		48	5486			5.98	359
31	5766	5334			44		50	5639			6.13	372
32	5918	5486			44		50	5791			6.28	376
33	6071	5639			46		52	5944			6.43	390
34	6223	5791			46		52	6096			6.59	394
35	6375	5944			48		54	6248			6.74	408
36	6528	6096			48		54	6401			6.89	412
37	6680	6248			50		56	6553			7.04	425
38	6833	6401	178	1930	50	1016	56	6706	330	635	7.19	429
39	7010	6553	203	1981	52	1067	58	6883	356	660	8.54	453
40	7163	6706			52		58	7036			8.72	457
41	7315	6858			54		60	7188			8.89	470
42	7468	7010			54		60	7341			9.07	475
43	7620	7163			56		62	7493			9.25	489
44	7772	7315			56		62	7645			9.42	493
45	7925	7468			58		64	7798			9.60	507
46	8077	7620			58		64	7950			9.77	511
47	8230	7772			60		66	8103			9.95	524
48	8382	7925			60		66	8255			10.13	529
49	8534	8077			62		68	8407			10.30	542
50	8687	8230			62		68	8560			10.48	547
51	8839	8382			64		70	8712			10.66	560
52	8992	8534			64		70	8865			10.83	565
53	9144	8687			66		72	9017			11.01	578
54	9296	8839	203	1981	66	1067	72	9169	356	660	11.18	583
	W=1651, M=559											N=5, S=7

COLUMN "D"

LINE	H	K	T	A LENGTH	A NO	B LENGTH	B NO	C NO.20 LENGTH	D NO.14 LENGTH	E NO.12 LENGTH	CONC. m^3	REINF. STEEL Kg
1	----	----	---	----	--	----	--	----	----	----	----	----
2	----	----	---	----	--	----	--	----	----	----	----	----
3	----	----	---	----	--	----	--	----	----	----	----	----
4	----	----	---	----	--	----	--	----	----	----	----	----
5	----	----	---	----	--	----	--	----	----	----	----	----
6	----	----	---	----	--	----	--	----	----	----	----	----
7	----	----	---	----	--	----	--	----	----	----	----	----
8	2235	1829	152	2032	20	965	28	2108	305	762	2.39	175
9	2388	1981			22		30	2261			2.53	189
10	2540	2134			22		30	2413			2.66	194
11	2692	2286			24		32	2565			2.79	208
12	2845	2438			24		32	2718			2.93	212
13	2997	2591			26		34	2870			3.06	226
14	3150	2743			26		34	3023			3.20	231
15	3302	2896			28		36	3175			3.33	245
16	3454	3048			28		36	3327			3.47	250
17	3607	3200			30		38	3480			3.60	264
18	3759	3353	152	2032	30	965	38	3632	305	762	3.74	269
19	3937	3505	178	2083	32	1016	40	3810	330	787	4.58	289
20	4089	3658			32		40	3962			4.74	294
21	4242	3810			34		42	4115			4.90	308
22	4394	3962			34		42	4267			5.06	313
23	4547	4115			36		44	4420			5.22	327
24	4699	4267			36		44	4572			5.38	332
25	4851	4420			38		46	4724			5.54	347
26	5004	4572			38		46	4877			5.70	352
27	5156	4724			40		48	5029			5.86	366
28	5309	4877			40		48	5182			6.02	371
29	5461	5029			42		50	5334			6.17	385
30	5613	5182			42		50	5486			6.33	390
31	5766	5334			44		52	5639			6.49	404
32	5918	5486			44		52	5791			6.65	409
33	6071	5639			46		54	5944			6.81	423
34	6223	5791			46		54	6096			6.97	438
35	6375	5944			48		56	6248			7.13	442
36	6528	6096			48		56	6401			7.29	447
37	6680	6248			50		58	6553			7.45	461
38	6833	6401	178	2083	50	1016	58	6706	330	787	7.61	466
39	7010	6553	203	2134	52	1067	60	6883	356	813	9.03	490
40	7163	6706			52		60	7036			9.21	495
41	7315	6858			54		62	7188			9.40	509
42	7468	7010			54		62	7341			9.58	514
43	7620	7163			56		64	7493			9.77	529
44	7772	7315			56		64	7645			9.96	533
45	7925	7468			58		66	7798			10.14	548
46	8077	7620			58		66	7950			10.33	553
47	8230	7772			60		68	8103			10.51	567
48	8382	7925			60		68	8255			10.70	572
49	8534	8077			62		70	8407			10.88	587
50	8687	8230			62		70	8560			11.07	591
51	8839	8382			64		72	8712			11.26	606
52	8992	8534			64		72	8865			11.44	611
53	9144	8687			66		74	9017			11.63	626
54	9296	8839	203	2134	66	1067	74	9169	356	813	11.81	638
	W=1829, M=711											N=6, S=8

TABLE 1 : CONCRETE DISPLACED BY PIPES

PIPE SIZES RCP	PIPE SIZES CMP	T=152 m^3	T=178 m^3	T=203 m^3
1050	1200	0.178	0.207	0.237
1200	1500	0.260	0.303	0.346
1350	1650	0.326	0.381	0.435
1500	1800	0.401	0.467	0.534
	1350	0.226	0.263	0.300

TABLE 2 : MAXIMUM PIPE SIZE TO BE USED

	RCP	CMP
COL. A	1050	1200
COL. B	1200	1500
COL. C	1350	1650
COL. D	1500	1800

TABLE 3 : CONCRETE NEEDED FOR FORMED INVERT.

PIPE SIZES	1050	1200	1350	1500	1650	1800	
RCP (m^3)	0.209	0.327	----	0.472	----	----	
CMP (m^3)	----	0.109	----	0.170	0.206	0.246	

STRUCTURAL STEEL :

RECTANGULAR GRATE & FRAME	= 154 Kg
BICYCLE - SAFE GRATE & FRAME	= 166 Kg
SOLID COVER & FRAME	= 215 Kg

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS | REMARKS | APPR. | DATE | NO.

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL
CHAIRMAN STANDARDS COMMITTEE — MAR.09,1999 DATE
APPROVED
DEPUTY DIRECTOR — MAR.09,1999 DATE

(METRIC)
SHT.3 OF 3
STANDARD CATCH BASIN AND CLEANOUT BOX
SCHEDULE OF INSTALLATION
1050-1500 RCP 1200-1800 CMP
STANDARD DRAWING TITLE

STD. DWG. NO.
1711-3

CONDUIT LEGEND

CONDUIT LINE STYLE	CONDUIT TYPE AND MINIMUM SIZE	ALLOWABLE CONDUCTOR TYPE
-1D 1D-	DUCT BANK: 1 - 4-MULTI-CONDUIT SYSTEM	FIBER OPTIC CABLES
-2D 2D-	DUCT BANK: 2 - 4-MULTI-CONDUIT SYSTEM	FIBER OPTIC CABLES
-4D 4D-	DUCT BANK: 4 - 4-MULTI-CONDUIT SYSTEM	FIBER OPTIC CABLES
-HV38 HV38-	38mm HIGH VOLTAGE CONDUIT	120, 240, OR 480 VAC CONDUCTORS INCLUDING: SIGNAL CONDUCTORS VMS POWER CONDUCTORS CAMERA POWER CONDUCTORS OR CAMERA COMPOSITE CABLES
-HV50 HV50-	50mm HIGH VOLTAGE CONDUIT	
-HV75 HV75-	75mm HIGH VOLTAGE CONDUIT	
- HV100 HV100 -	100mm HIGH VOLTAGE CONDUIT	
-LV38 LV38-	38mm LOW VOLTAGE CONDUIT	DETECTOR LOOP LEAD-IN CABLES VMS CONTROL CABLES CAMERA CABLES RWIS CABLES
-LV50 LV50-	50mm LOW VOLTAGE CONDUIT	
-LV75 LV75-	75mm LOW VOLTAGE CONDUIT	
- LV100 LV100 -	100mm LOW VOLTAGE CONDUIT	
- TAL38 TAL38 -	38mm TAIL CIRCUIT COMMUNICATIONS CONDUIT	FIBER OPTIC CABLES, COPPER COMM CABLES
- TAL50 TAL50 -	50mm TAIL CIRCUIT COMMUNICATIONS CONDUIT	FIBER OPTIC CABLES, COPPER COMM CABLES
- TAL75 TAL75 -	75mm TAIL CIRCUIT COMMUNICATIONS CONDUIT	FIBER OPTIC CABLES, COPPER COMM CABLES
- SPR50 SPR50 -	50mm SPARE CONDUIT	(EMPTY)
- SPR75 SPR75 -	75mm SPARE CONDUIT	(EMPTY)
- SPR100 SPR100 -	100mm SPARE CONDUIT	(EMPTY)
-e-e-e-e-e-	BURIED ELECTRIC CONDUIT Existing Buried Electric Conduit	POWER CONDUCTORS (ADD NEW to Existing Conductors as Noted)
-xC xC-	Existing Conduit	(ADD NEW to Existing Conductors as Noted)
-x1d x1d-	EXISTING DUCT BANK: 1 - 4-MULTI-CONDUIT SYSTEM	
-x2d x2d-	EXISTING DUCT BANK: 2 - 4-MULTI-CONDUIT SYSTEM	
-x4d x4d-	EXISTING DUCT BANK: 4 - 4-MULTI-CONDUIT SYSTEM	
- PWR38 PWR38 -	38mm POWER CONDUIT	CONDUCTORS WITH VOLTAGE 120V OR GREATER, USUALLY ONLY BETWEEN POWER SERVICE POINT AND POWER SERVICE PEDESTAL
- T/LV75 T/LV75 -	75mm CONDUIT WITH TWO 25mm INNERDUCTS: (ONE 25mm TAIL CIRCUIT COMMUNICATIONS INNERDUCT ONE 25mm LOW VOLTAGE INNERDUCT)	FIBER OPTIC CABLES LOW VOLTAGE CONDUCTORS (SAME AS ABOVE)

NOTE: LOWER-CASE TEXT INDICATES EXISTING CONDUIT

ABBREVIATIONS

ATMS	ADVANCED TRAFFIC MANAGEMENT SYSTEM
CAB	CABINET
CCTV	CLOSED CIRCUIT TELEVISION
CCVC	CAMERA CONTROL AND VIDEO CABLE
DLC	DETECTOR LOOP LEAD-IN CABLES
FRE	FIBERGLASS REINFORCED EPOXY
GND	GROUND CONDUCTOR
HDPE	HIGH DENSITY POLYETHYLENE
HFC	HYBRID FIBER CABLE
P	PLASTIC
PC	POLYMER CONCRETE
PCCP	PORTLAND CEMENT CONCRETE PAVEMENT
PTCC	PAN-TILT CONTROL CABLE
PTZ	PAN / TILT / ZOOM
PWR	POWER
RMS	RAMP METER STATION
ROW	RIGHT-OF-WAY
RWIS	ROADWAY WEATHER INFORMATION SYSTEM
### SMF	SINGLE MODE FIBER (### INDICATES NUMBER OF STRANDS)
TMS	TRAFFIC MONITORING STATION
TSC	TRAFFIC SIGNAL CONTROLLER
VAC	VOLTS (ALTERNATING CURRENT)
VID	VIDEO
VMS	VARIABLE MESSAGE SIGN
WP	WORKING POINT

EQUIPMENT LEGEND

FUTURE OR EXISTING	REQ'D	EQUIPMENT TYPE
		334, VMS, OR ATMS CABINET (WITH CABINET NUMBER)
		SIGNAL CABINET
		CCTV CAMERA / PTZ / POLE AND FOUNDATION
		TYPE 1 FREEWAY VARIABLE MESSAGE SIGN (VMS) ASSEMBLY
		UNDERGROUND POWER SERVICE PEDESTAL
PS	PS	POWER SERVICE POINT
		POWER POLE
		METER ON POLE
		DETECTOR LOOP
		PAD MOUNTED TRANSFORMER
		POLE MOUNTED TRANSFORMER
		ROADWAY WEATHER INFORMATION SYSTEM
		POLE
		ADVANCE FLASHING BEACON SIGN ON POLE
		MASTARM WITH SIGNAL HEADS
		SIGNAL HEADS
		METER-ON SIGNAL HEAD

AERIAL LEGEND

CONDUIT LINE STYLE	DESCRIPTION
-e-e-e-e-	Existing Overhead Power Lines
-E-E-E-E-	OVERHEAD POWER LINES

CONDUCTOR LEGEND

CALLOUT	REQ'D ITEM
X-#Y(Z)	(X) AWG # (Y) POWER CONDUCTORS FOR (Z)
X-#Y(GND)	(X) AWG # (Y) GROUND WIRE
IE: 2-#6(VMS CAB)	INDICATES (2)AWG#6 POWER
1-#8(GND)	CONDUCTORS REQ'D AND (1)AWG#8 GROUND WIRE REQ'D FOR A VMS CABINET.

DETAIL CALLOUT LEGEND

CALLOUT ON PLAN	MEANING
X / Y	SEE DETAIL "X" ON SHEET "Y"

JUNCTION BOX LEGEND

Existing	REQ'D	PAY ITEM NAME
I-PC	I-PC	TYPE I POLYMER CONCRETE JUNCTION BOX
II-PC	II-PC	TYPE II POLYMER CONCRETE JUNCTION BOX
III-PC	III-PC	TYPE III POLYMER CONCRETE JUNCTION BOX
I-P	I-P	TYPE I PLASTIC JUNCTION BOX
II-P	II-P	TYPE II PLASTIC JUNCTION BOX

ELECTRICAL SCHEMATIC LEGEND

EXISTING	SYMBOL	EQUIPMENT
		BREAKER
(M)	M	METER
N	N	NEUTRAL LUG
EG	EG	EQUIPMENT GROUND LUG
		GROUND ROD
		TRANSFORMER
		SWITCH

NOTE: DASHED LINES INDICATE EXISTING EQUIPMENT

PROJECT NOTE LEGEND

CB	CONNECT NEW CONDUIT TO Existing Junction Box or Vault
BC	INSTALL NEW BOX OR VAULT IN Existing Conduit Run
CC	CONNECT NEW CONDUIT TO Existing Conduit
SP	SPLICE POINT

STANDARD CALL OUT FOR CONDUCTOR INSTALLATION

lv75 - LOWER CASE TEXT INDICATES EXISTING CONDUIT
1-#2C - UPPER CASE TEXT INDICATES REQUIRED NEW CONDUCTORS

REVISIONS

NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
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RECOMMENDED FOR APPROVAL — JAN.09.2002 DATE

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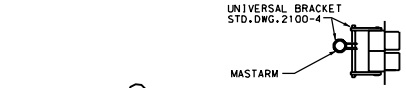
DEPUTY DIRECTOR

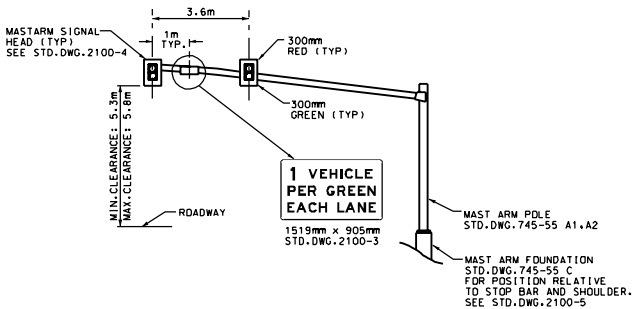
(METRIC)

STANDARD DRAWING TITLE: LEGEND SHEET

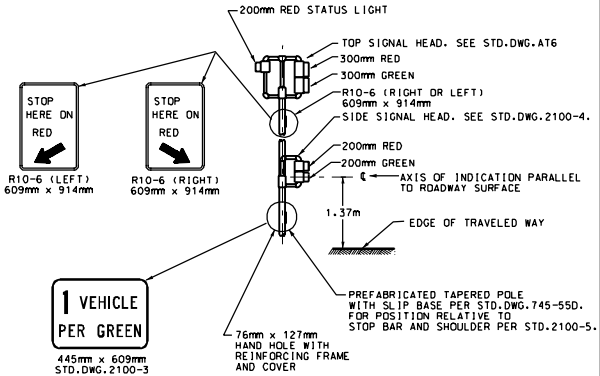
STD. DWG. NO. 2100-1



SECTION B

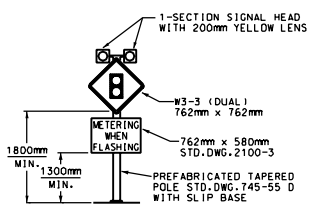


MASTARM SIGNAL ASSEMBLY



RAMP METER SIGNAL ASSEMBLY

WITH ENFORCEMENT INDICATION



ADVANCE FLASHING BEACON ASSEMBLY

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

NO.	DATE	APPR.	REMARKS

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DEPUTY DIRECTOR

(METRIC)

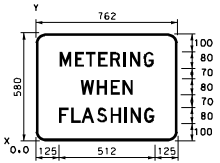
STANDARD DRAWING TITLE

RAMP METER DETAILS

STD. DWG. NO.

2100-2

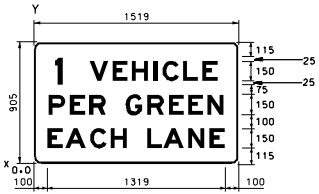
SIGN DETAIL
NOT TO SCALE



WIDTH x HEIGHT	762mm x 580mm
BORDER WIDTH	15mm
CORNER RADIUS	50mm
MOUNTING	GROUND
BACKGROUND	TYPE: REFLECTIVE
	COLOR: YELLOW
LEGEND/BORDER	TYPE: NON-REFLECTIVE
	COLOR: BLACK

COORDINATES ARE TO LOWER LEFT CORNERS

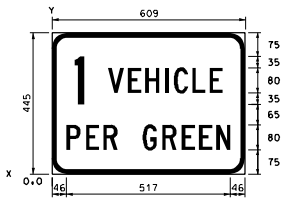
Y FONT	LETTER POSITIONS (X)														HT LEN
400	M	E	T	E	R	I	N	G							80
D	128	210	269	334	399	473	505	579							506
250	W	H	E	N											80
D	241	327	401	466											280
100	F	L	A	S	H	I	N	G							80
D	125	190	245	328	402	476	508	582							512



WIDTH x HEIGHT	1519mm x 905mm
BORDER WIDTH	15mm
CORNER RADIUS	50mm
MOUNTING	OVERHEAD
BACKGROUND	TYPE: REFLECTIVE
	COLOR: WHITE
LEGEND/BORDER	TYPE: NON-REFLECTIVE
	COLOR: BLACK

COORDINATES ARE TO LOWER LEFT CORNERS

Y FONT	LETTER POSITIONS (X)														HT LEN
615	V	E	H	I	C	L	E								150
EM	415	584	727	888	957	1110	1253								950
590	1														200
EM	155														60
365	P	E	R	G	R	E	E	N							150
EM	108	268	411	683	843	1004	1147	1290							1304
115	E	A	C	H	L	A	N	E							150
EM	100	233	417	570	841	963	1147	1308							1319



WIDTH x HEIGHT	609mm x 445mm
BORDER WIDTH	15mm
CORNER RADIUS	50mm
MOUNTING	GROUND
BACKGROUND	TYPE: REFLECTIVE
	COLOR: WHITE
LEGEND/BORDER	TYPE: NON-REFLECTIVE
	COLOR: BLACK

COORDINATES ARE TO LOWER LEFT CORNERS

Y FONT	LETTER POSITIONS (X)														HT LEN
255	V	E	H	I	C	L	E								80
C	177	240	294	356	384	442	497								361
220	1														150
C	71														31
75	P	E	R	G	R	E	E	N							80
C	46	108	162	286	348	410	464	518							517

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DATE

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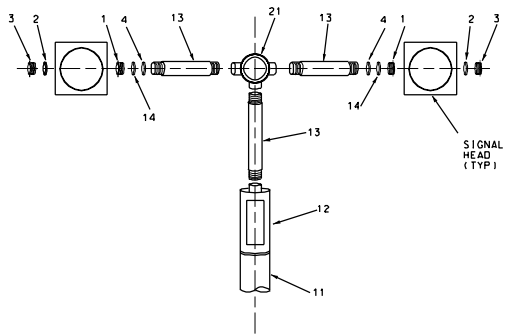
DATE

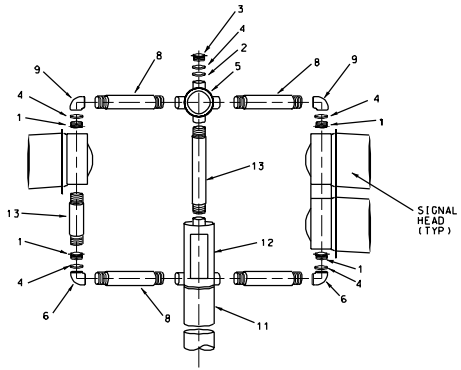
DEPUTY DIRECTOR

(METRIC)
RAMP METER SIGN PANEL
STANDARD DRAWING TITLE

STD. DWG. NO.
2100-3



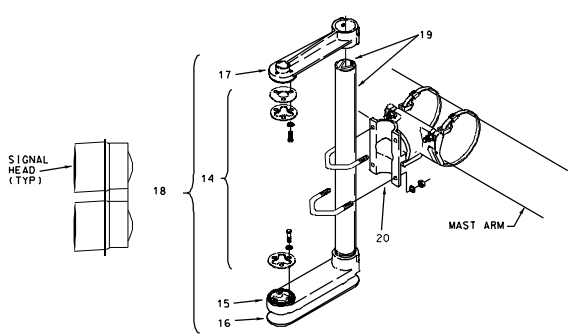
ADVANCE FLASHING BEACON SIGNAL HEAD MOUNTING DETAILS



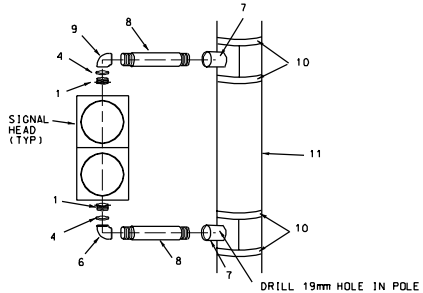
TOP SIGNAL HEAD MOUNTING DETAILS
WITH ENFORCEMENT INDICATION

NOTES:

1. LOCK NIPPLE, 38mm x 45mm.
2. LOCK NUT, 38mm.
3. ORNAMENTAL CAP, LONG.
4. WASHER, STAINLESS STEEL BAND, 2 WRAPS.
5. CENTER HUB W/ COVER PLATE 4-WAY.
6. ELBOW, 90°, 38mm SERRATED.
7. ROUND POLE PLATE.
8. GALVANIZED PIPE 38mm x 305mm THREADED BOTH ENDS.
9. 38mm PLAIN ELBOW.
10. 19mm STAINLESS STEEL.
11. POLE SHAFT.
12. POSTMOUNT WITH TERMINAL COMPARTMENT.
13. 38mm PIPE, LENGTH VARIABLE, THREADED BOTH ENDS.
14. UNIVERSAL MOUNT STANDARD HARDWARE KIT.
15. STANDARD LOWER ARM
16. COVER
17. STANDARD UPPER ARM
18. UNIVERSAL BRACKET STANDARD ARM KIT
19. GUSSET TUBE.
20. UNIVERSAL BRACKET.



MASTARM SIGNAL HEAD MOUNTING DETAILS



SIDE SIGNAL HEAD MOUNTING DETAILS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

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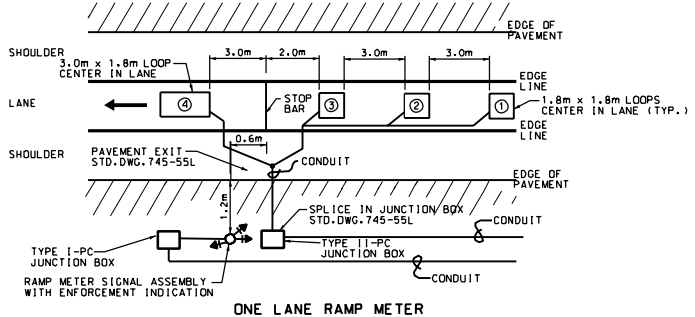
DEPUTY DIRECTOR

(METRIC)

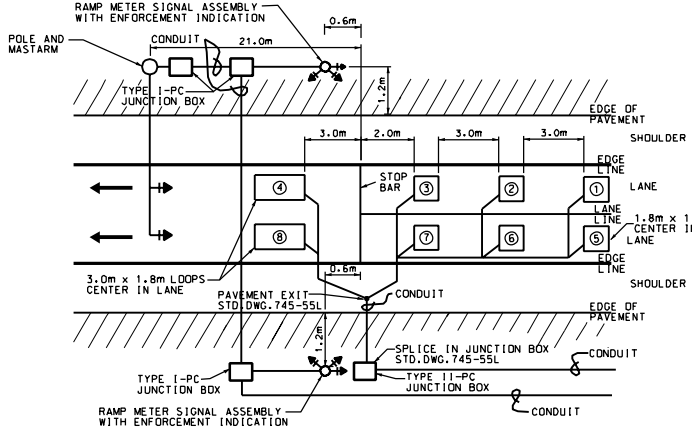
TYPICAL RAMP METER
SIGNAL HEAD MOUNTING

STANDARD DRAWING TITLE

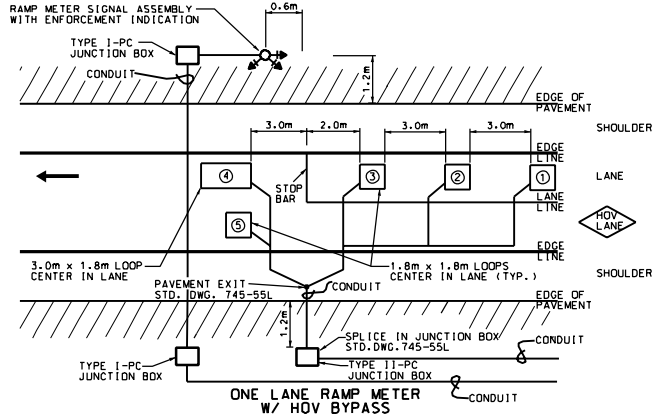
STD. DWG. NO.
2100-4



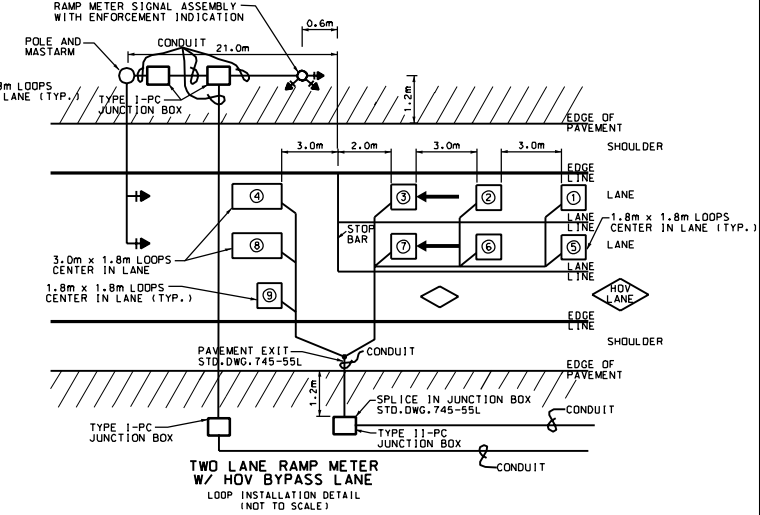
ONE LANE RAMP METER
LOOP INSTALLATION DETAIL
(NOT TO SCALE)



TWO LANE RAMP METER
LOOP INSTALLATION DETAIL
(NOT TO SCALE)



ONE LANE RAMP METER
W/ HOV BYPASS
LOOP INSTALLATION DETAIL
(NOT TO SCALE)



TWO LANE RAMP METER
W/ HOV BYPASS LANE
LOOP INSTALLATION DETAIL
(NOT TO SCALE)

NOTES:

1. THESE DETAILS SHOW THE PASSAGE AND PRESENCE LOOPS. THE LOCATION OF QUEUE LOOPS ARE NOT SHOWN.
2. TAG EACH LOOP WIRE IN EACH JUNCTION BOX. BEGINNING WITH FIRST LOOP IN LANE CLOSEST TO SHOULDER.
3. USE ROUND CUT FOR CONCRETE ROUND CUTS CAN ALSO BE USED FOR ASPHALT IF DESIRED.

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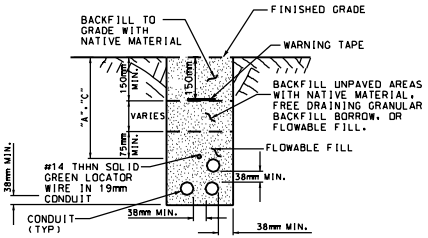
STANDARD DRAWING TITLE

(METRIC)

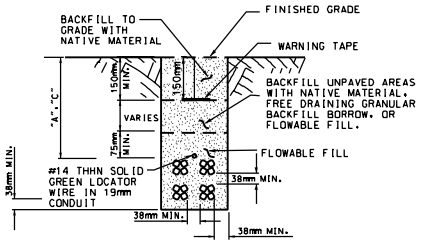
LOOP INSTALLATION

STD. DWG. NO.

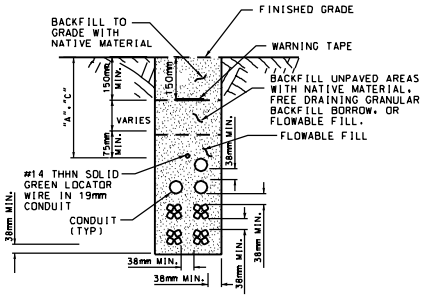
2100-5



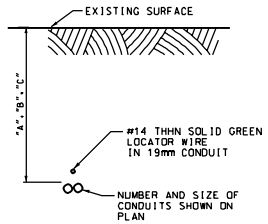
NON-MULTIDUCT CONDUIT TRENCHED IN NATIVE EARTH



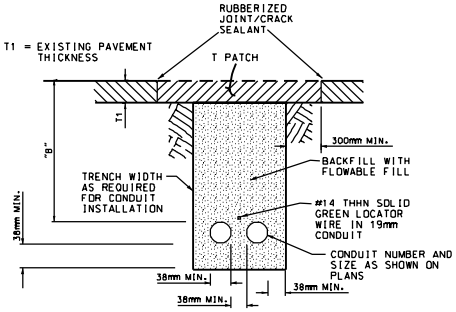
MULTIDUCT CONDUIT TRENCHED IN NATIVE EARTH



MULTIDUCT AND NON-MULTIDUCT CONDUIT TRENCHED IN NATIVE EARTH



CONDUIT BORED, JACKED, OR DRILLED



CONDUIT TRENCHED UNDER ASPHALT PAVEMENT RESTORED WITH T PATCH

TABLE 1. T PATCH RESTORATION

EXISTING PAVEMENT THICKNESS (T1) IN MILLIMETERS	RESTORATION T PATCH THICKNESS IN MILLIMETERS
0 - 90	90
90 - 150	MATCH EXISTING DEPTH
150 OR GREATER	150

TABLE 2. CONDUIT DEPTH

	DEPTH in mm	AREA
A	610	PAVED DITCHES, UNLINED DITCHES, GUTTERS, SIDEWALK
B	915	HIGHWAY RIGHT OF WAY UNDER ASPHALT PAVEMENT SURFACE
C	1500	W/IN 6.1m OF PAVEMENT EDGE WHERE SIGNS OR DELINEATORS PRESENT

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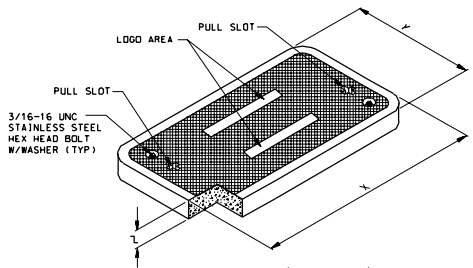
DEPUTY DIRECTOR — JAN.08,2002 DATE

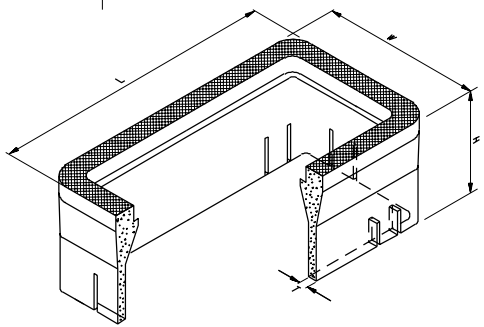
(METRIC)

STANDARD DRAWING TITLE

CONDUIT DETAILS

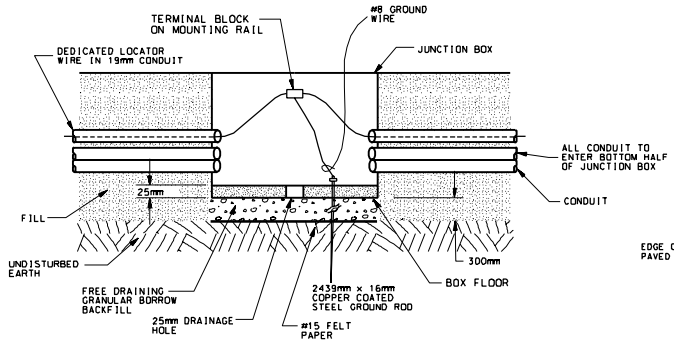
STD. DWG. NO.
2100-6



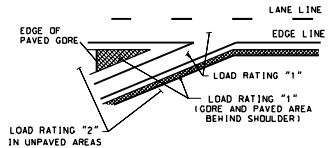


BOX AND LID DIMENSIONS

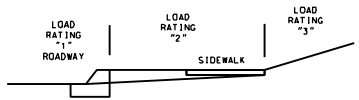
BOX TYPE	"L" mm	"W" mm	"H" mm	"T" mm	"X" mm	"Y" mm	"Z" mm
I-PC	634	406	610	38	591	349	51
II-PC	819	489	610	38	775	445	51
III-PC	1261	816	610	50	1210	765	76



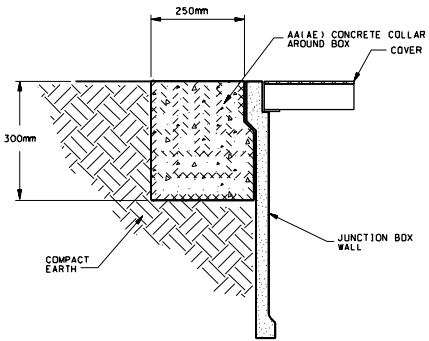
JUNCTION BOX CONDUIT PENETRATION DETAIL



FREEWAY APPLICATION



ARTERIAL STREET APPLICATION



JUNCTION BOX CONCRETE COLLAR DETAIL

TABLE 1.FREEWAY AND ARTERIAL STREET APPLICATION

	APPLICATION	LOAD RATING 1	2	3
FREEWAY	TRAVELED-WAY/PAVED SHOULDER	X		
	INCIDENTAL TRAFFIC: PAVED GDRE, PAVED AREA BEHIND SHOULDER	X		
	ALL OTHER AREAS		X	
ARTERIAL	TRAVELED-WAY/PAVED SHOULDER	X		
	NON-RAISED MEDIAN, INDUSTRIAL/COMMERCIAL DRIVEWAYS	X		
	PARKWAY/SIDEWALK		X	
	BEHIND SIDEWALK, NOT WHEEL LOADING ACCESSIBLE			X

TABLE 2.JUNCTION BOX LID STATIC VERTICAL LOAD RATING

LOAD RATING	COVER ENCLOSURE	DESIGN LOAD	TEST LOAD	TEST AREA
1	HS20	9435 kg	20473 kg	254 mm x 508 mm
2	INCIDENTAL TRAFFIC (10K)	4536 kg	10236 kg	254 mm x 508 mm
3	PLASTIC	3629 kg	5443 kg	254 mm x 254 mm

NOTES:

1. SEE STD. DWG. 745-55M FOR PLASTIC TYPE I AND TYPE II JUNCTION BOXES.

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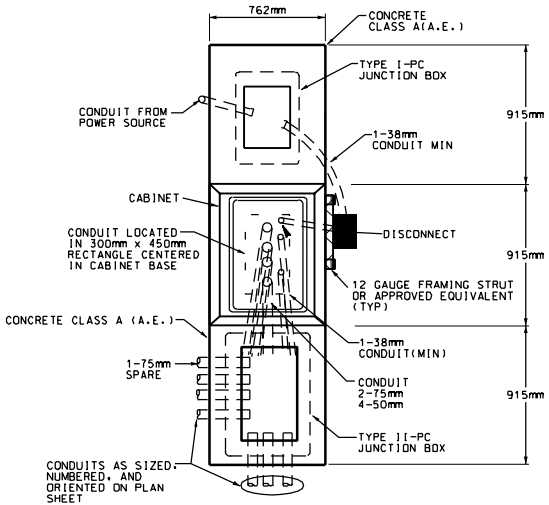
DEPUTY DIRECTOR

(METRIC)

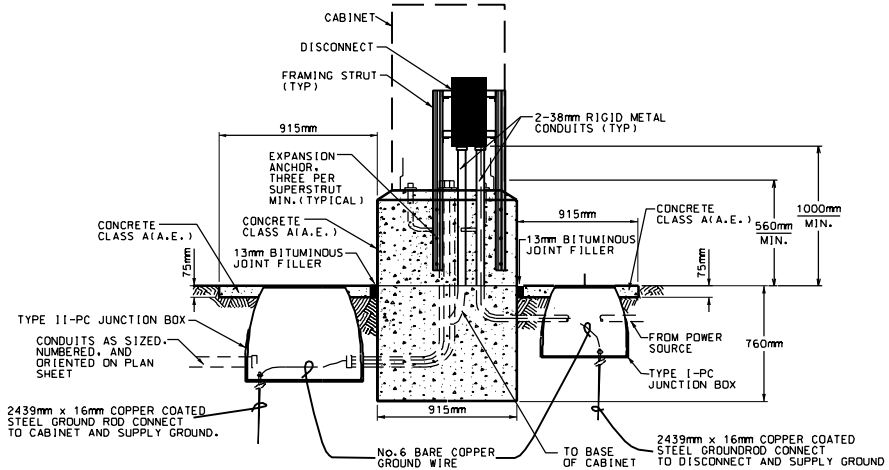
POLYMER-CONCRETE JUNCTION BOX DETAILS

STANDARD DRAWING TITLE

STD. DWG. NO.
2100-7



ATMS CABINET - PLAN VIEW



ATMS CABINET - SIDE VIEW

ATMS CABINET WITH 120V DISCONNECT

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

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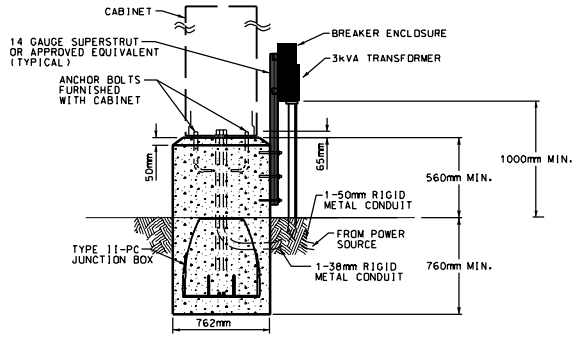
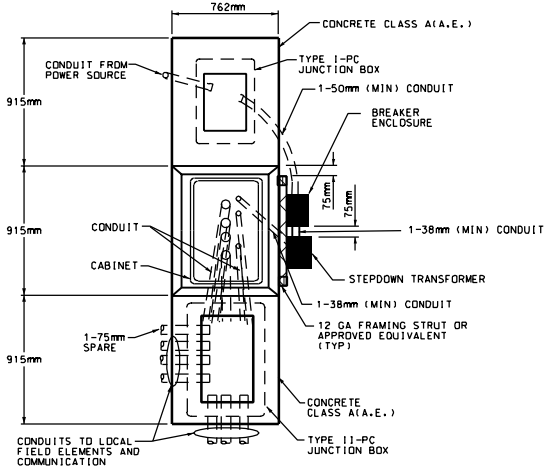
STANDARD DRAWING TITLE
ATMS CABINET W/120V DISCONNECT

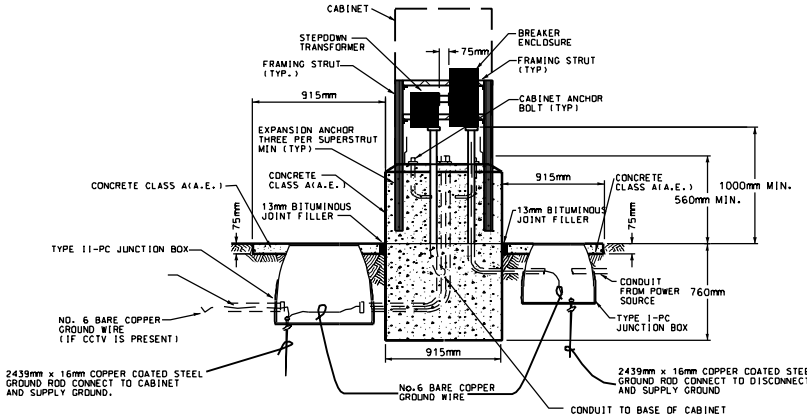
STD. DWG. NO.
2100-8



ATMS/334 CABINET - FRONT VIEW



ATMS CABINET - PLAN VIEW



ATMS CABINET - SIDE VIEW

ATMS CABINET WITH STEPDOWN TRANSFORMER

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

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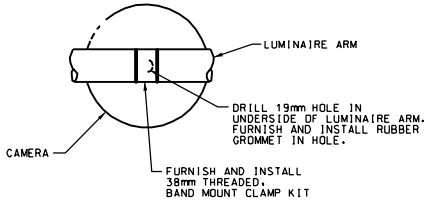
DEPUTY DIRECTOR

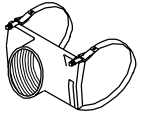
(METRIC)

STANDARD DRAWING TITLE
ATMS CAB WITH STEPDOWN TRANSFORMER

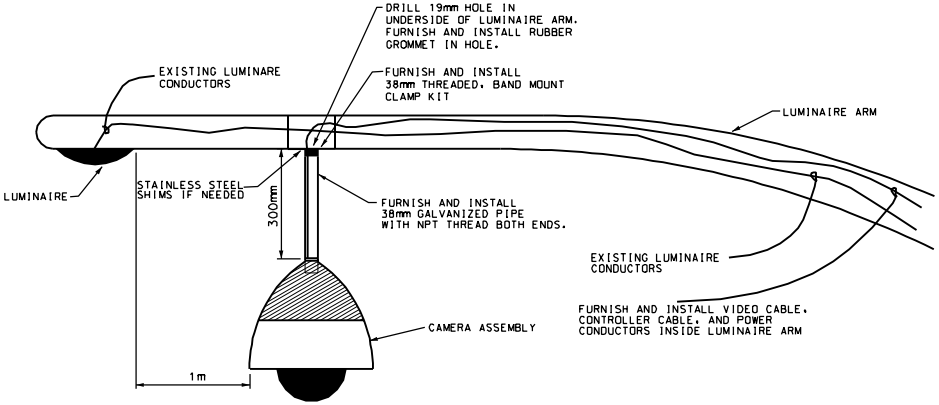
STD. DWG. NO.
2100-9



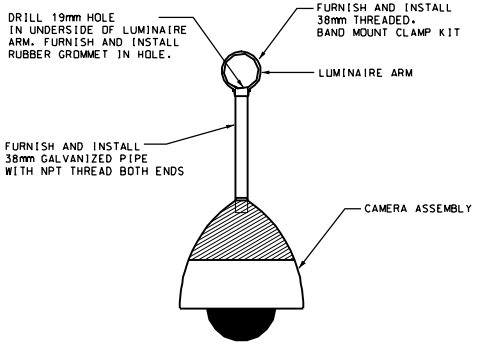
TOP VIEW



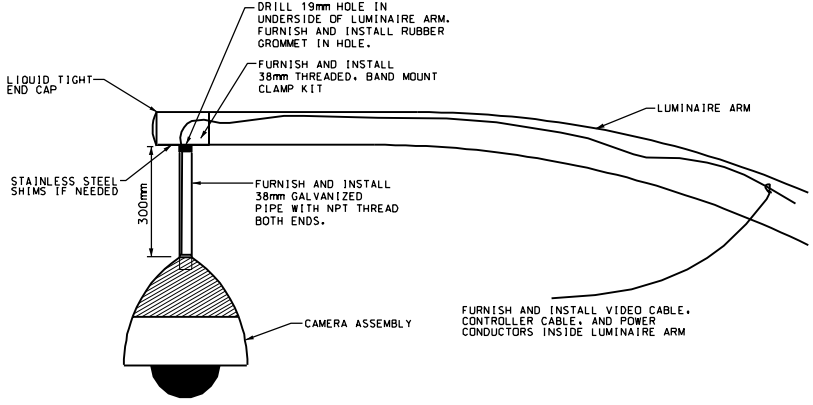
38mm THREADED. BAND MOUNT CLAMP KIT



CAMERA ELEVATION W/LUMINAIRE EXTENSION



SECTION VIEW



CAMERA ELEVATION W/END CAP

CAMERA ON LUMINAIRE DETAILS

ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED.

REVISIONS

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UTAH DEPARTMENT OF TRANSPORTATION
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SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — JAN.08.2002 DATE

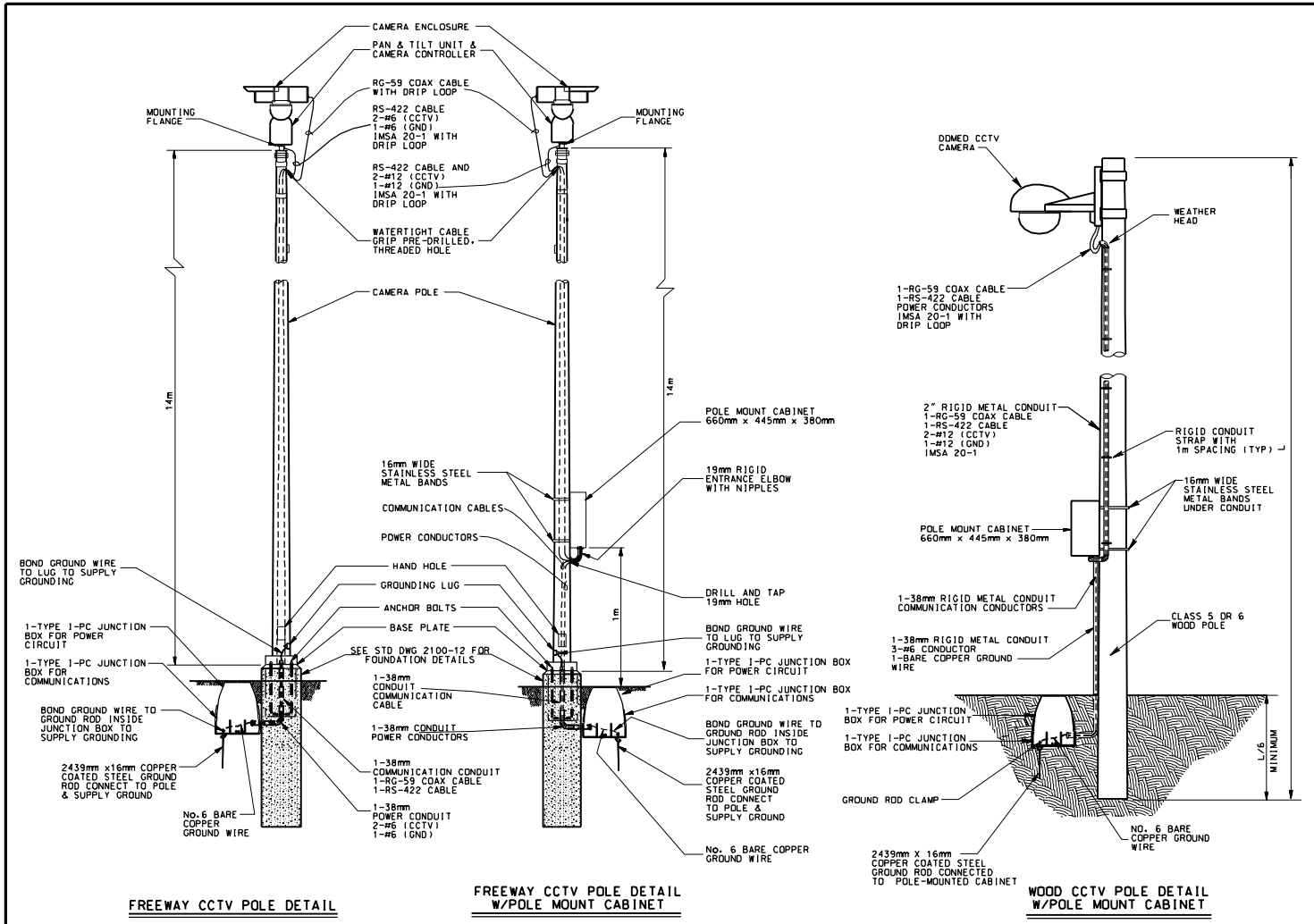
CHAIRMAN STANDARDS COMMITTEE APPROVED — JAN.08.2002 DATE

DEPUTY DIRECTOR

(METRIC)

STANDARD DRAWING TITLE: DOMED CCTV DETAILS

STD. DWG. NO. 2100-10



FREEWAY CCTV POLE DETAIL

FREEWAY CCTV POLE DETAIL W/POLE MOUNT CABINET

WOOD CCTV POLE DETAIL W/POLE MOUNT CABINET

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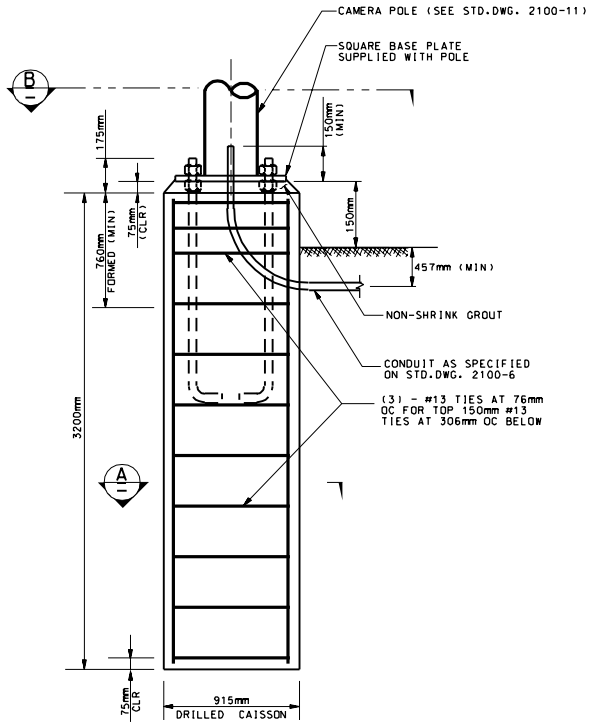
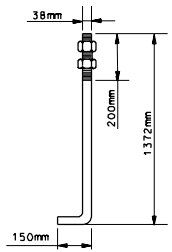
CCTV POLE DETAIL

STANDARD DRAWING TITLE

STD. DWG. NO.
2100-11

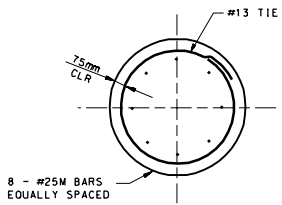




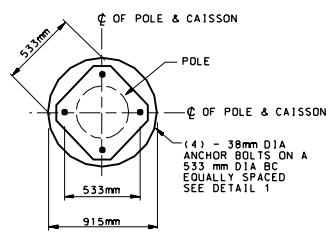
(4) - ANCHOR BOLTS WITH
(2) - HEX NUTS AND 2 WASHERS

GALVANIZE THE TOP 250mm OF THE ANCHOR BOLTS IN ACCORDANCE WITH ASTM A 153

DETAIL 1
ANCHOR BOLTS



SECTION A
NTS



SECTION B

CAISSON FOUNDATION DETAILS

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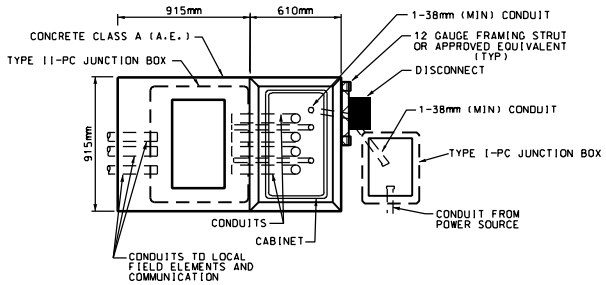
DEPUTY DIRECTOR

(METRIC)

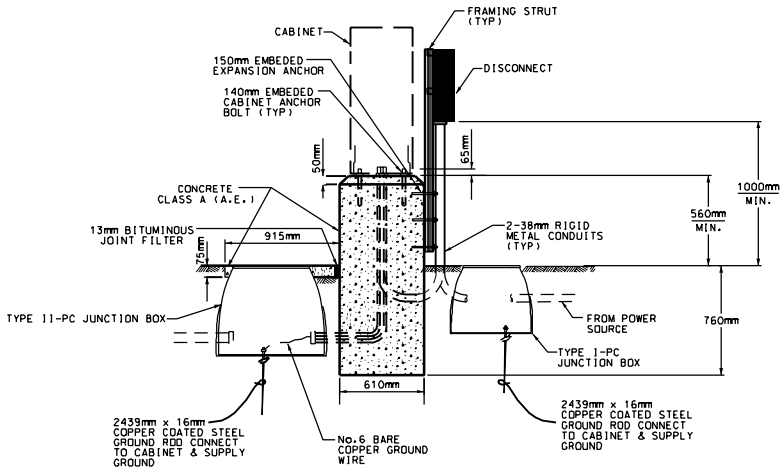
CCTV POLE FOUNDATION FOR DEDICATED CCTV POLE

STANDARD DRAWING TITLE

STD. DWG. NO.
2100-12



VMS CABINET - PLAN VIEW



VMS CABINET - SIDE VIEW

VMS CABINET WITH 120V DISCONNECT

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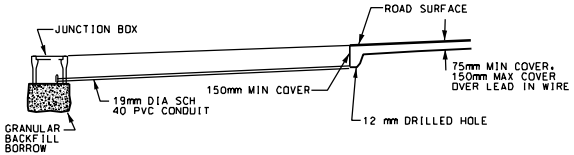
DEPUTY DIRECTOR

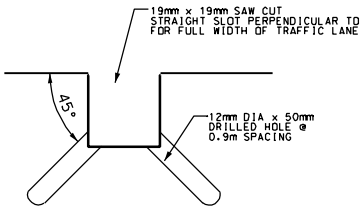
(METRIC)

STANDARD DRAWING TITLE
120V VMS CAB
FOUNDATION DETAILS

STD. DWG. NO.
2100-13



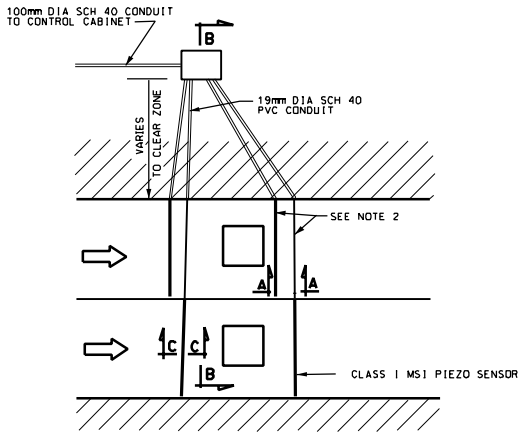
SECTION B-B



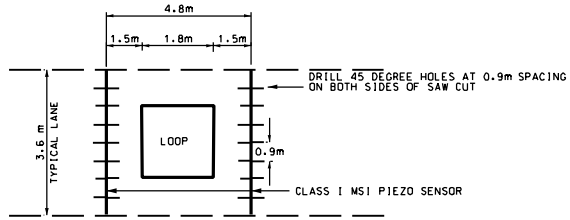
SAW CUT DETAIL

NOTES:

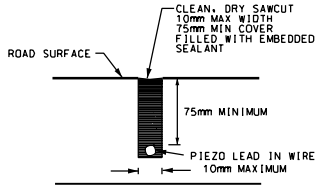
1. REFER TO STANDARD DRAWING 2100-5 FOR LOOP DETECTOR DETAILS.
2. MAINTAIN 150mm MIN. SPACING BETWEEN SAW CUT AND ANY CONCRETE JOINTS. LOCATE ALL LEAD INS DOWN STREAM OF PIEZO.



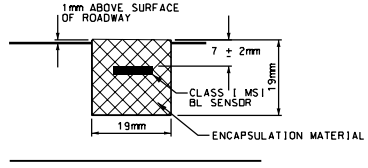
PLAN



TYPICAL PIEZO DETAIL



SECTION A-A



SECTION C-C

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STANDARD DRAWING TITLE
WEIGHT IN MOTION PIEZO DETAIL

STD. DWG. NO.
2100-14